# Significant Metalliferous Lode Deposits and Placer Districts of Alaska

U.S. GEOLOGICAL SURVEY BULLETIN 1786

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## COVER

Mill buildings at Kennecott, Alaska. The Kennecott district Cu-Ag mines in the Wrangell Mountains were some of the principal sources of copper in North America from 1913 to 1938. See deposit description for Kennecott district (number 30 for southern Alaska). Copyrighted drawing used by permission of Gail Niebrugge, artist, Glennallen, Alaska.

## PREFACE

This report is a compilation of the significant metalliferous lode deposits and placer districts of Alaska, and is a comprehensive data base for a companion article on the metallogenesis and major mineral deposits of Alaska that will be published in the volume on Alaskan geology for the Decade of North American Geology (DNAG) by the Geological Society of America. This report is based on recent unpublished data on metalliferous mineral deposits of Alaska, and on recent and older published articles and summaries of Alaskan mineral deposits and regional geology. The unpublished data were contributed by mineral deposit and regional geologists in private industry, universities, the U.S. Geological Survey, the Alaska Division of Geological and Geophysical Surveys, the U.S. Bureau of Mines, and the authors. Data were also obtained for classification of metalliferous mineral deposits from mineral deposit geologists in the U.S. Geological Survey. The 54 contributors who gave freely of their data, with affiliations at the time of contribution, are:

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## PLATES

[In pocket]

1. Map showing locations of significant metalliferous lode deposits of Alaska.
2. Map showing locations of significant metalliferous placer districts of Alaska.

# Significant Metalliferous Lode Deposits and Placer Districts of Alaska

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## INTRODUCTION

Alaska is commonly regarded as one of the new frontiers in North America for discovering metalliferous mineral deposits. A major theme in the history of the State has been repeated "rushes" or "stampedes" to sites of newly discovered metalliferous lode or placer deposits. During the last two decades, there has been extensive exploration for lode and placer mineral deposits by private mining exploration companies. During the same period, because of the considerable interest in Federal lands in Alaska, and the establishment of new national parks, wildlife refuges, and Native corporations, substantial studies of mineral deposits and of the mineral resource potential of Alaska have been conducted by the U.S. Geological Survey, the U.S. Bureau of Mines, and the Alaska Division of Geological and Geophysical Surveys. These studies have resulted in abundant new information on Alaskan mineral deposits. In the same period, substantial geologic mapping has been completed with the advent of modern logistical and technical tools. One result of the bedrock studies has been the recognition of numerous fault-bounded packages designated as tectonostratigraphic terranes, each with a distinctive stratigraphy, structure, metamorphism, and suite(s) of mineral deposits. Proponents of this concept suggest that most of Alaska consists of a collage of tectonostratigraphic terranes (Jones and others, 1984b; Monger and Berg, 1984).

This report provides new and timely, detailed tabular summaries of the 262 significant metalliferous lode deposits and districts, and the 43 placer districts of Alaska as of early 1986. The term "significant deposits" is defined as all metalliferous mines, prospects, deposits, or occurrences that the authors and contributors judged to be important, on the basis of size, geological importance, or interest, for an in-depth survey. For each deposit, the report also states for each deposit a precise location, common names, major metals or commodities, a mineral deposit type, the host-rock geology, data on tonnage, grade, and production, if known, and sources of information. The location of metalliferous lode deposits is shown on plate 1; the location of placer districts is shown on plate 2.

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## PREVIOUS STUDIES

Within the last 23 years, a few statewide summaries and several regional summaries of Alaskan metalliferous lode and placer deposits have been published by the U.S. Geological Survey (USGS), and the Alaska Division of Geological and Geophysical Surveys (ADGGS). In 1964, the USGS published a map of placer gold occurrences (Cobb, 1964). In 1967, the USGS published a statewide summary of metalliferous lode deposits (Berg and Cobb, 1967). In 1973, the USGS published a summary of Alaskan placer deposits (Cobb, 1973). In 1976 and 1977, the USGS published a series of regional tables, maps, and references for metalliferous deposits as part of the Regional Mineral Resource Assessment Program

(RAMRAP). These RAMRAP reports cover the Brooks Range (Grybeck, 1977), the Seward Peninsula (Hudson and others, 1977), central Alaska (Eberlein and others, 1977), the eastern part of southern Alaska (MacKevett and Holloway, 1977a), and the western part of southern Alaska (MacKevett and Holloway, 1977b). In 1981, the USGS published a report on all known mines, prospects, deposits, and occurrences for southeastern Alaska (Berg and others, 1981). In 1982, the Arctic Environmental Information and Data Center (AEIDC) published a series of regional mineral terrane maps of Alaska, prepared by C. C. Hawley and Associates, showing the location, size, and type of major metalliferous mineral deposits (AEIDC, 1982). In 1984, the USGS published a report summarizing the regional geology, metallogeny, and mineral resources of southeastern Alaska (Berg, 1984). In recent years, a yearly listing of Alaskan lode and placer deposits has been published by the ADGGS; the most recent publication is by Eakins and others (1985). Also during the last two decades, many commodity studies have been published by the USGS, the U.S. Bureau of Mines, and the ADGGS; these commodity studies are cited below in the descriptions of specific deposits. One important recent commodity study was published by Orris and Bliss (1985) on placer deposits of the United States.

## CLASSIFICATION OF MINERAL DEPOSITS

Metalliferous lode deposits in this report are classified into 29 types, and placer deposits are classified into 4 types, described below. This classification of mineral deposits was mainly derived from the mineral deposit models of specialists as compiled in Cox and Singer (1986), and to a lesser degree from earlier studies of Erickson (1982) and Cox (1983a, b). Four mineral deposit models for metalliferous deposits common in Alaska were formulated for this study. These additional models are for metamorphosed sulfide, Cu-Ag quartz vein, felsic-plutonic U lode, and placer Sn deposits. The lode deposit types are listed in order from those formed at or near the surface, such as various stratiform deposits, to those formed at deeper levels, such as zoned mafic-ultramafic and podiform chromite deposits. Placer deposit types are listed last. Some lode deposit types that share a common origin, such as contact metasomatic or porphyry deposits, are grouped together under a single heading. For a few lode deposits, lack of data precludes classification into a specific mineral deposit type. For these deposits, a brief description of the deposit is enclosed in parentheses under the "Type" heading in table 1.

The mineral deposit models used in this report and as described in Cox and Singer (1986) consist of both descriptive and genetic information that is systematically arranged to describe the essential properties of a class of mineral deposits. Some models are descriptive (empirical), in which instance the various attributes are recognized as essential, even though their relationships are unknown. An example of a descriptive mineral deposit model is the basaltic Cu model, as adapted for this study, in which the empirical datum of a geologic association of Cu sulfides with relatively Cu-rich metabasalt or greenstone is the essential attribute. Other models are genetic (theoretical), in which case the attributes are related through some fundamental concept. An example is the W or Fe skarn (contact metasomatic) deposit model in which case the genetic process of contact metasomatism is the essential attribute. For additional information on the methodology of mineral deposit models, the reader is referred to the discussion by Cox and Singer (1986).

### Lode Deposit Types

Kuroko massive sulfide deposit (Donald A. Singer in Cox and Singer, 1986). This deposit type consists of volcanogenic, massive to disseminated sulfides that occur in felsic to intermediate marine volcanic, pyroclastic, and bedded sedimentary rocks. The volcanic rocks are mainly rhyolite and dacite with subordinate basalt and andesite. The depositional environment is mainly hot springs related to marine volcanism in island arcs or in extensional regimes. The deposit minerals include pyrite, chalcopyrite, sphalerite, and lesser galena, tetrahedrite, tennantite, and magnetite. Local alteration to zeolites, montmorillonite, silica, chlorite, and sericite may occur. Notable examples are the Arctic, Smucker, and Sun deposits in the Brooks Range, the WTF, Red Mountain deposits, and Delta district deposits in east-central Alaska, and the Greens Creek, Glacier Creek, Khayyam, and Orange Point deposits in southeastern Alaska.

Besshi massive sulfide deposit (Dennis P. Cox in Cox and Singer, 1986). This deposit type consists of thin, sheetlike bodies of massive to well-laminated pyrite, pyrrhotite, and chalcopyrite, and lesser sulfide minerals, within thinly laminated clastic sedimentary rocks and mafic tuffs. The rock types are mainly marine clastic sedimentary rocks, basaltic and less commonly andesitic tuff and breccia, and local black shale and red chert. The depositional environment is uncertain, but may possibly be submarine hot springs related to submarine basaltic volcanism. Associated minerals include sphalerite, and lesser magnetite, galena, bornite, and tetrahedrite, with gangue quartz, carbonates, albite, white mica, and chlorite. Alteration is sometimes difficult to recognize because of metamorphism. Notable examples are the Midas, Latouche, Beatson, Ellamar, and Fidalgo-Alaska mines in the Prince William Sound region of southern Alaska.

Cyprus massive sulfide deposit (Donald A. Singer in Cox and Singer, 1986). This deposit type consists of massive sulfides in pillow

basalt. The depositional environment consists of submarine hot springs along an axial graben in oceanic or back-arc spreading ridges, or hot springs related to submarine volcanoes in seamounts. The deposit minerals consist mainly of pyrite, chalcopyrite, sphalerite, and lesser marcasite and pyrrhotite. The sulfides occur in pillow basalt that is associated with tectonized dunite, harzburgite, gabbro, sheeted diabase dikes, and fine-grained sedimentary rocks, all part of an ophiolite assemblage. Beneath the massive sulfides is sometimes stringer or stockwork pyrite, pyrrhotite, minor chalcopyrite, and spalerite. The sulfide minerals are sometimes brecciated and recemented. Alteration in the stringer zone consists of abundant quartz, chalcedony, chlorite, and some illite and calcite. Some deposits are overlain by Fe-rich and Mn-poor ochre. Notable examples are the Knight Island and Threeman mines, and the Copper Bullion deposit, all in coastal southern Alaska.

Sedimentary exhalative Zn-Pb deposit (Joseph A. Briskey in Cox and Singer, 1986). This deposit type consists of stratiform, massive to disseminated sulfides occurring in sheetlike or lenslike tabular bodies that are interbedded with euxinic marine sedimentary rocks including dark shale, siltstone, limestone, chert, and sandstone. The depositional environment consists mainly of marine epicratonic embayments and intracratonic basins, with smaller local restricted basins. The deposit minerals include pyrite, pyrrhotite, sphalerite, galena, barite, and chalcopyrite. Extensive alteration may occur, including stockwork and disseminated sulfides, silica, albite, and chlorite. Notable examples are the Lik and Red Dog Creek deposits in the northwestern Brooks Range.

Kipushi Cu-Pb-Zn (carbonate-hosted Cu) deposit (Dennis P. Cox in Cox and Singer, 1986). This deposit type consists of stratabound, massive sulfides hosted mainly in dolomitic breccia. The depositional environment consists mainly of high fluid flow along faults or karst(?)-breccia zones. Generally no rocks of unequivocal igneous origin are related to the deposit. The deposit minerals include pyrite, bornite, chalcocite, chalcopyrite, carrollite, sphalerite, and tennantite with minor reinerite and germanite. Local alteration to dolomite, siderite, and silica may occur. Notable examples are the Ruby Creek and Omar deposits in the Brooks Range.

Metamorphosed sulfide deposit (this study). This deposit type consists of stratabound, massive to disseminated sulfides hosted in moderately to highly metamorphosed and deformed metavolcanic or metasedimentary rocks. Metamorphism and deformation have obscured protoliths of host rocks and deposits so as to preclude classification into more specific deposit types. The interpreted host rocks for these deposits are mainly felsic to mafic metavolcanic rocks, and metasedimentary or metavolcanic schist and gneiss. The deposit minerals include chalcopyrite, sphalerite, galena, bornite, sometimes with pyrite, magnetite, and hematite. Alteration is usually difficult to recognize because of metamorphism. These deposits occur mainly in the regional metamorphic rocks in southeastern Alaska in either the Coast plutonic-metamorphic complex or the Alexander belt. Notable examples are the Sweetheart Ridge, Sumdum, Groundhog Basin, and Moth Bay deposits, all in southeastern Alaska.

Bedded barite deposit (Greta J. Orris in Cox and Singer, 1986). This deposit type consists of stratiform, massive barite interbedded with marine cherty and calcareous sedimentary rocks, mainly dark chert, shale, mudstone, and dolomite. The depositional environment consists of epicratonic marine basins or embayments, often with smaller local restricted basins. Bedded barite deposits are often associated with sedimentary exhalative Zn-Pb (not described here) or Kuroko massive sulfide deposits (described above). Alteration consists of secondary barite veining and local, weak to moderate sericite replacement. Associated minerals include minor witherite, pyrite, galena, and sphalerite. Notable examples are the Nimiuktuk deposit in the northwestern Brooks Range and the Castle Island mine in southeastern Alaska.

Sandstone U deposit (Christine Turner Peterson and Carroll A. Hodges in Cox and Singer, 1986). This deposit type consists of concentrations of uranium oxides and related minerals in localized, reduced environments in medium- to coarse-grained feldspathic or tuffaceous sandstone, arkose, mudstone, and conglomerate. The depositional environment is continental basin margins, fluvial channels, fluvial fans, or stable coastal plain, sometimes with nearby felsic plutons or felsic volcanic rocks. The deposit minerals include pitchblende, coffinite, carnotite, and pyrite. A notable example is the Death Valley deposit in the eastern part of the Seward Peninsula region.

Basaltic Cu deposit (adapted from Dennis P. Cox in Cox and Singer, 1986). This deposit type consists of copper sulfides in large pipes and lenses in carbonate rocks within a few tens of meters of disconformably underlying subaerial basalt. The depositional environment consists of subaerial basalt overlain by mixed shallow marine and nearshore carbonate sedimentary rocks, including sabkha-facies carbonate rocks; subsequent subaerial erosion, ground-water leaching and (or) low-grade regional metamorphism may concentrate copper sulfides into pipes and lenses. The deposit minerals consist of chalcocite and lesser bornite, chalcopyrite, and other Cu sulfides, and oxidized Cu minerals. Alteration minerals are sometimes obscured by, or may include, malachite, azurite, metamorphic chlorite, actinolite, epidote, albite, quartz, zeolites, and secondary dolomite. Notable examples are in the Kennecott district and at the Westover, Nelson, and Erickson mines, all in southern Alaska.

Hot-spring Hg deposit (James J. Rytuba in Cox and Singer, 1986). This deposit type con-

sists of cinnabar, antimony, pyrite, and minor marcasite and native mercury in veins and in disseminations in graywacke, shale, andesite and basalt flows, andesite tuff and tuff breccia, and diabase dikes. The depositional environment is near paleo-groundwater table in areas of former hot springs. Various alteration minerals such as kaolinite, alunite, Fe oxides, and native sulfur occur above the paleo-groundwater table; pyrite, zeolites, potassium feldspar, chlorite, and quartz occur below the paleo-groundwater table. Notable examples are the Red Devil, DeCoursey Mountain, and Cinnabar Creek mines in west-central Alaska.

Epithermal vein deposit (Dan L. Mosier, Takeo Sato, Norman J Page, Donald A. Singer, and Byron R. Berger in Cox and Singer, 1986). This deposit type consists of quartz-carbonate-pyrite veins with a wide variety of minerals, including gold, silver sulfosalts, chalcopyrite, argentite, galena, sphalerite, and arsenopyrite. The veins occur in felsic to intermediate volcanic rocks, sometimes overlying older volcanic sequences or igneous intrusions. One class of epithermal vein deposits, such as those at Creede, Colorado, has high concentrations of Pb, Zn, and Ag, sometimes high Cu, and low Au; another class, such as those at Sado, Japan, has high Au, moderate to low Ag, sometimes high Cu, and generally low Pb and Zn concentrations. For both groups, the host volcanic rock composition ranges from andesite to rhyolite. The depositional environment is intermediate to felsic volcanic arcs and centers. Associated minerals include electrum, chalcopyrite, copper and silver sulfosalts, with lesser tellurides and bornite. Alteration minerals include quartz, kaolinite, montmorillonite, illite, and zeolites. Notable examples are the Aquila and Shumagin deposits, and the Apollo-Sitka mine on the Alaska Peninsula.

Low-sulfide Au quartz vein deposit (Byron R. Berger in Cox and Singer, 1986). This deposit type, abbreviated to "Au quartz vein" in the descriptions below, consists of gold in massive, persistent quartz veins in regionally metamorphosed volcanic rocks, metamorphosed graywacke, chert, and shale. The depositional environment is low-grade metamorphic belts. The veins are generally late synmetamorphic to postmetamorphic and locally cut granitic rocks. Associated minerals are minor pyrite, galena, sphalerite, chalcopyrite, arsenopyrite, and pyrrhotite. Alteration minerals include quartz, siderite, albite, and carbonate. Notable examples are the Big Hurrah mine on the Seward Peninsula, the Chandalar district mines in the southern Brooks Range, the Willow Creek district mines, the Nuka Bay, Monarch, Jewel, Granite, and Cliff mines in southern Alaska, and the Alaska-Juneau, Jualin, Kensington, Sumdum Chief, Treadwell, Nido, and Chichagoff mines in southeastern Alaska.

Cu-Ag quartz vein deposit (this study). This deposit type consists of Cu sulfides and accessory silver in quartz veins and disseminations in weakly regionally metamorphosed mafic igneous rocks, mainly basalt and gabbro, and lesser andesite and dacite. The depositional environment is low-grade metamorphic belts. The veins are generally late-stage metamorphic. The deposit minerals include chalcopyrite, bornite, lesser chalcocite, and rare native copper. Alteration minerals include epidote, chlorite, actinolite, albite, quartz, and zeolites. Notable examples are the Kathleen-Margaret and Nikolai mines in southern Alaska.

Polymetallic vein deposit (Dennis P. Cox in Cox and Singer, 1986). This deposit type consists of quartz-carbonate veins often with silver, gold, and associated base-metal sulfides. The veins are related to hypabyssal intrusions in sedimentary and metamorphic terranes, or to metamorphic fluids forming during waning regional metamorphism. The associated intrusions range in composition from calcalkaline to alkaline and occur in dike swarms, hypabyssal intrusions, small to moderate-size intermediate to felsic plutons, locally associated with andesite to rhyolite flows. The depositional environment is near-surface fractures and breccias within thermal aureoles of small to moderate-size intrusions, including within the intrusions. The deposit minerals include native gold, electrum, pyrite, and sphalerite, sometimes with chalcopyrite, galena, arsenopyrite, tetrahedrite, Ag sulfosalts, and argentite. Alteration consists of wide propylitic zones and narrow sericitic and argillic zones. Notable examples are the Independence and Golden Horn mines, and the Broken Shovel and Beaver Creek deposits in west-central Alaska, the Quigley Ridge, Banjo, Spruce Creek, and Stampede deposits in the Kantishna district of east-central Alaska, the Cleary Summit and Ester Dome mines in the Fairbanks district of east-central Alaska, the Sedanka and Bonanza Hills deposits of the Alaska Peninsula, and the Golden Zone deposit of southern Alaska.

Sb-Au vein deposit (Adapted from simple Sb deposit of James D. Bliss and Greta J. Orris in Cox and Singer, 1986). This deposit type consists of massive to disseminated stibnite and lesser gold in quartz-carbonate veins, pods, and stockworks that occur in or adjacent to brecciated or sheared fault zones, in sedimentary, volcanic, and metamorphic rocks adjacent to granitic plutons, in contact aureoles around granitic plutons, and peripheries of granodiorite, granite, and monzonite plutons. Some Sb-Au vein deposits are transitional into polymetallic vein deposits. The depositional environment is faults and shear zones, epizonal fractures adjacent to or within the margins of epizonal granitic plutons. Associated minerals include arsenopyrite, chalcopyrite, and tetrahedrite, and sometimes cinnabar and galena. This deposit type is locally associated with polymetallic vein deposits. Alteration consists mainly of silica, sericite, and argillite. Notable examples are the Slate Creek, Eagles Den, and Caribou Creek deposits in the Kantishna district of east-central Alaska, and the Scrafford mine in east-central Alaska.

Sn greisen, Sn vein, and Sn skarn deposits (Bruce L. Reed and Dennis P. Cox in Cox and Singer, 1986). These three deposit types commonly occur in the same area, and some grade into one another. The Sn greisen deposit type consists of disseminated cassiterite, cassiterite-bearing veinlets, and Sn sulfosalts in stockworks, lenses, pipes, and breccia in greisenized granite, mainly biotite and (or) muscovite leucogranite emplaced in a mesozonal to deep volcanic environment. Sn greisens are generally postmagmatic and are associated with late-stage, fractionated granitic magmas. Associated minerals include molybdenite, arsenopyrite, beryl, scheelite, and wolframite. Alteration minerals consist of incipient to massive replacement quartz, muscovite, tourmaline, and fluorite. Notable examples are the Kougarok deposit on the Seward Peninsula and the Coal Creek deposit in southern Alaska.

The Sn vein deposit type consists of simple to complex fissure fillings or replacement lodes in or near felsic plutonic rocks, mainly mesozonal to hypabyssal plutons, commonly with dike swarms. The deposits tend to occur within or above the apices of granitic cusps and ridges. The deposit minerals are extremely varied and include cassiterite, wolframite, arsenopyrite, molybdenite, scheelite, and beryl. Alteration minerals consist of sericite, tourmaline, quartz, chlorite, and hematite. A possible example is the Lime Peak deposit in east-central Alaska.

The Sn skarn deposit type consists of Sn, W, and Be minerals in skarns, veins, stockworks, and greisen near intrusive contacts between epizonal(?) granitic plutons and limestone. The deposit minerals include cassiterite, sometimes with scheelite, sphalerite, chalcopyrite, pyrrhotite, magnetite, and fluorite. Alteration consists of greisen near granite margins, and metasomatic development of andradite, idocrase, amphibole, chlorite, chrysoberyl, and mica in skarn. A notable example is the Lost River mine on the Seward Peninsula.

Cu-Zn-Pb (± Au, Ag) skarn, W skarn, and Fe (± Au) skarn (contact metasomatic) deposits (Dennis P. Cox and Theodore G. Theodore in Cox and Singer, 1986). Cu-Zn-Pb skarn deposit type consists of chalcopyrite, sphalerite, and galena in calc-silicate skarns that replace carbonate rocks along intrusive contacts with plutons of quartz diorite to granite and diorite to syenite. Zn-Pb-rich skarns tend to occur farther from the intrusion; Cu- and Au-rich skarns tend to occur closer to the intrusion. The depositional environment is mainly calcareous sedimentary sequences intruded by felsic to intermediate granitic plutons. Associated minerals include pyrite, hematite, magnetite, bornite, arsenopyrite, and pyrrhotite. Metasomatic replacements consist of a wide variety of calc-silicate and related minerals. Notable examples of Cu-Zn-Pb skarn deposits are the Bowser Creek, Rat Fork, Sheep Creek, and Tin Creek deposits. Notable examples of Cu-Au and Au skarn deposits are the Nixon Fork-Medfra mine in west-central Alaska and the Jumbo mine in southeastern Alaska.

The W skarn deposit type consists of scheelite in calc-silicate skarns that replace carbonate rocks along or near intrusive contacts with quartz diorite to granite plutons. The depositional environment is along contacts and in roof pendants of batholiths and thermal aureoles of stocks that intrude carbonate rocks. Associated minerals are molybdenite, pyrrhotite, sphalerite, chalcopyrite, bornite, pyrite, and magnetite. Metasomatic replacements consist of a wide variety of calc-silicate and related minerals. Notable examples are the deposits and mines in the Gilmore Dome area of the Fairbanks district in east-central Alaska.

The Fe skarn deposit type consists of magnetite and (or) Fe sulfides in calc-silicate skarns that replace carbonate rocks or calcareous clastic rocks along intrusive contacts with diorite, granodiorite, granite, and coeval volcanic rocks. The depositional environment is along intrusive contacts. The chief associated mineral is chalcopyrite. Metasomatic replacements consist of a wide variety of calc-silicate and related minerals. Notable examples are the Medfra deposit in west-central Alaska, the Nabesna and Rambler mines in southern Alaska, and the Kasaan Peninsula mine in southeastern Alaska.

Porphyry Cu-Mo, porphyry Cu, and porphyry Mo deposit (Dennis P. Cox and Theodore G. Theodore in Cox and Singer, 1986). The porphyry Cu-Mo deposit type consists of stockwork veinlets of quartz, chalcopyrite, and molybdenite in or near porphyritic intermediate to felsic intrusions. The intrusions occur mainly in stocks and breccia pipes that intrude batholithic, volcanic, or sedimentary rocks. The depositional environment is high-level intrusive porphyries that are contemporaneous with abundant dikes, faults, and breccia pipes. Associated minerals include pyrite and peripheral sphalerite, galena, and gold. Alteration minerals consist of quartz, K-feldspar, and biotite or chlorite. Notable examples are the Taurus deposit in east-central Alaska, the Orange Hill, Bond Creek, Baultoff, Horsfeld, Carl Creek deposits in southern Alaska, and the Pyramid deposit in the Alaska Peninsula.

The porphyry Cu deposit type consists of chalcopyrite in stockwork veinlets in hydrothermally altered porphyry and adjacent country rock. The porphyries range in composition from tonalite to monzogranite to syenitic porphyry. The depositional environment is epizonal intrusive rocks with abundant dikes, breccia pipes, cupolas of batholiths, and faults. Associated minerals are pyrite, molybdenite, magnetite, and bornite. Alteration consists of sodic, potassic, phyllic, argillic, and propylitic types. An example is the Margerie deposit in southeastern Alaska.

The porphyry Mo deposit type consists of quartz-molybdenite stockwork veinlets in grani-

tic porphyry and adjacent country rock. The porphyries range in composition from tonalite to granodiorite to monzogranite. The depositional environment is epizonal. Associated minerals are pyrite, scheelite, chalcopyrite, and tetrahedrite. Alteration consists of potassic grading outward to propylitic, sometimes with phyllic and argillic overprint. Notable examples are the Bear Mountain deposit in the northeastern Brooks Range and the Quartz Hill deposit in southeastern Alaska.

Felsic plutonic U deposit (this study). This deposit type consists of disseminated uranium minerals, thorium minerals, and REE-minerals in fissure veins and alkalic granite dikes in or along the margins of alkalic and peralkalic granitic plutons, or in granitic plutons, including granite, alkalic granite, granodiorite, syenite, and monzonite. The depositional environment is mainly the margins of epizonal to mesozonal granitic plutons. The deposit minerals include allanite, thorite, uraninite, bastnaesite, monazite, uranothorianite, and xenotime, sometimes with galena and fluorite. Notable examples are the Roy Creek (Mount Prindle) deposit in east-central Alaska, and the Bokan Mountain deposits in southeastern Alaska.

Gabbroic Ni-Cu deposit (adapted from synorogenic-synvolcanic Ni-Cu deposit of Norman J Page in Cox and Singer, 1986). This deposit type consists of massive lenses, matrix, and disseminated sulfides in small to medium-size composite mafic and ultramafic intrusions in metamorphic belts of metasedimentary and metavolcanic rocks. In most areas of Alaska, the depositional environment consists of post-metamorphic and post-deformational, intermediate-level intrusion of norite, gabbro-norite, and ultramafic rocks. The deposit minerals include pyrrhotite, pentlandite, and chalcopyrite, sometimes with pyrite, Ti- or Cr-magnetite, and PGE minerals and alloys. Accessory cobalt minerals also occur in some deposits. Notable examples are the Funter Bay, Brady Glacier, Bohemia Basin, and Mirror Harbor deposits, all in southeastern Alaska.

Zoned mafic-ultramafic Cr-Pt (± Cu, Ni, Co, Pd, Au, Ti or Fe) (Alaskan-type) deposit (Alaskan PGE deposit type of Norman J Page and Floyd Gray in Cox and Singer, 1986). This deposit type consists of crosscutting ultramafic to mafic plutons with approximately concentric zoning that contain chromite, native PGE, PGE minerals and alloys, and Ti-V magnetite. In most areas of Alaska, the depositional environment consists of postmetamorphic and postdeformational, intermediate-level intrusion of mafic and (or) ultramafic plutons. The deposit minerals include combinations of chromite, PGE minerals and alloys, pentlandite, pyrrhotite, Ti-V magnetite, bornite, and chalcopyrite. Notable examples are the Kemuk Mountain deposit in west-central Alaska, the Union Bay, Duke Island, and Klukwan deposits, and the Salt Chuck mine, all in southeastern Alaska.

Podiform chromite deposit (John P. Albers in Cox and Singer, 1986). This deposit type consists of podlike masses of chromite in the ultramafic parts of ophiolite complexes, locally intensely faulted and dismembered. The host rock types are mainly dunite and harzburgite, commonly serpentinized. The depositional environment consists of magmatic cumulates in elongate magma pockets. Associated minerals are magnetite and PGE minerals and alloys. Notable examples are the Iyikrok Mountain, Misheguk Mountain, and Avan deposits in the northwestern Brooks Range, the Kaiyuh River deposit in west-central Alaska, and the Halibut Bay, Claim Point, and Red Mountain deposits in southern Alaska.

Serpentine-hosted asbestos deposit (Norman J Page in Cox and Singer, 1986). This deposit type consists of chrysotile asbestos developed in stockworks in serpentinized ultramafic rocks. The depositional environment is usually an ophiolite sequence, sometimes with later deformation or igneous intrusion. Associated minerals are magnetite, brucite, talc, and tremolite. A notable example is the Fortymile deposit in east-central Alaska.

## Placer Deposits

In this study and in the compilations of mineral deposit models by Cox and Singer (1986), placer deposits are classified primarily by metals and secondarily by sedimentary processes. The principal sedimentary processes are fluvial and glaciofluvial, shoreline, and eluvial or residual. Fluvial and glaciofluvial deposits form where river velocities lessen at hydraulic flexures, on the inside of meanders, below rapids and falls, and beneath boulders. Shoreline deposits form in areas of strandline accumulations that are caused by shoreline drift, beach storms, wind, and wave action. Eluvial or residual deposits form by the mechanical and (or) chemical disintegration of bedrock in the general absence of the concentrating force of water.

Placer Au deposit (Warren Yeend in Cox and Singer, 1986). This deposit type consists of elemental gold as grains and rarely as nuggets in gravel, sand, silt, and clay, and their consolidated equivalents in alluvial, beach, eolian, and rarely in glacial deposits. The depositional environment is high-energy alluvial where gradients flatten and river velocities lessen as at the inside of meanders, below rapids and falls, beneath boulders, and in shoreline areas where the winnowing action of surf causes gold concentrations found in raised, present, or submerged beaches. The major deposit minerals are gold, sometimes with attached quartz, magnetite or ilmenite. Notable examples are in the Wiseman district in the southern Brooks Range, the Nome, Council, and Fairhaven districts on the Seward Peninsula, the Marshall, Aniak, Iditarod, Innoko, McGrath, Ruby, Hughes, Hot Springs, and Tolovana districts in west-central Alaska, the Fairbanks, Circle, Fortymile, and Kantishna placer districts in east-central Alaska, the Valdez, Chistochina, Nizina,

Hope, and Willow Creek districts in southern Alaska, and the Porcupine Creek and Juneau districts in southeastern Alaska.

Placer Sn deposit (this study). This deposit type consists of mainly cassiterite and elemental gold in grains in gravel, sand, silt, and clay, and their consolidated equivalents, mainly in alluvial deposits. The depositional environment is similar to that of placer Au deposits. Notable examples are deposits derived from Sn granites, such as in the Kougarok district on the Seward Peninsula, and the Hot Springs district in west-central Alaska.

Placer PGE-Au deposit (Warren Yeend and Norman J Page in Cox and Singer, 1986). This deposit type consists of PGE minerals and alloys in grains in gravel, sand, silt, and clay, and their consolidated equivalents in alluvial, beach, eolian, and rarely in glacial deposits. In some areas, placer Au and placer PGE deposits occur together. The depositional environment is high-energy alluvial where gradients flatten and river velocities lessen as at the inside of meanders, below rapids and falls, beneath boulders, and in shoreline areas where the winnowing action of surf causes PGE and gold concentrations in raised, present, or submerged beaches. The major deposit minerals are Pt-group alloys, Os-Ir alloys, magnetite, chromite, and ilmenite. A notable example is the Goodnews Bay placer district.

Shoreline placer Ti deposit (Eric R. Force in Cox and Singer, 1986). This deposit type consists of ilmenite and other heavy minerals concentrated by beach processes and enriched by weathering. The hosting sediment types are medium- to fine-grained sand in dune, beach, and inlet deposits. The depositional environment is stable coastal region receiving sediment from bedrock regions. The major deposit minerals are low-Fe ilmenite, sometimes with rutile, zircon, and gold. Notable examples are the Yakutat and Lituya Bay placer districts.

## EXPLANATION OF TABULAR HEADINGS

### Lode Deposits

#### Map Number, Latitude, and Longitude

Map number refers to a specific deposit in a given region. In this report, Alaska is divided into seven geographic regions for the tabular descriptions of metalliferous lode deposits, each identified by a two-letter prefix that is part of the deposit number. The regions and abbreviations are the Brooks Range (BR), the Seward Peninsula (SP), west-central Alaska (WC), east-central Alaska (EC), the Aleutian Islands and Alaska Peninsula (AP), southern Alaska (SO), and southeastern Alaska (SE). The prefix for all placer districts is PL. Lode deposits are numbered separately for each region. Locations for all deposits or districts are given in north latitude and west longitude in degrees and minutes to the nearest minute. For groups of deposits or districts, the latitude and longitude are stated for the center of the area.

#### Name, Commodities

Names of lode deposits are derived from published sources or common usage. In some cases, two deposits are grouped together and both names are given. In other cases, an alternate name is given in parentheses. Commodities are the known potentially valuable metals reported for each deposit. Commodities are listed in order of decreasing abundance and(or) value, and are shown by standard chemical symbols.

#### Type, Geologic Host Unit

Type of lode deposit is an interpretation that was made by examining the description of the deposit and then classifying the deposit using the mineral deposit types previously described. The type is queried where insufficient description precludes precise determination. For a few deposits, either the closest two mineral deposit types are listed, or else a short description is given in parentheses. Geologic host unit refers to the lithology and general age of the wallrocks enclosing a lode mineral deposit. The I.U.G.S. classification was used for plutonic rock names.

#### Tonnage and Grade; Production, If Known

Where known, estimates of tonnage and grade are listed. Tonnages are listed in tonnes (metric tons). Grades are stated either in percent (%), for abundant metals, or in grams per tonne (g/t) for scarce and precious metals. In many deposits, the only available information is on the grade(s) of grab samples. The metric system (SI) is used for all volume and weight measurements.

#### Description and Sources

The description summarizes the major features of the deposit. Where known, the major economic minerals, gangue minerals, and the deposit form are stated. Form of deposit denotes the physical aspect of a deposit, whether, for example, a vein, disseminated mineral grains, or masses of minerals. Form is descriptive, and is distinct from genetic terms such as "contact metasomatic" or "volcanogenic," which imply origin or history. Because lode deposits may be geologically complex, a deposit may contain more than one form, and certain forms may be gradational. If publicly known, the length, width, and depth of the deposit are stated. Additional information on the host rocks and their relation to the deposit are also stated. Information on extent of underground or surface workings and on the period of mining or development is given, if known. Sources of information, stated at the end

of each description, are the references and oral or written communications used to compile the data for each deposit. Unpublished data gathered expressly for this report are indicated by the terms "written communication" or "oral communication" for the period of 1984 through 1986. Older unpublished, nonconfidential data were obtained from the files of the U.S. Geological Survey and the Alaska Division of Geological and Geophysical Surveys.

### Placer Districts

Table headings for deposits in placer districts are described only for headings differing from those for lode deposits. Data are compiled for only those important districts with over 31,300 g (1,000 oz) gold production.

District refers to the name of a group of geologically and geographically related placer deposits, as derived from published sources or from general usage. In some cases, two or more districts are grouped together and both names are given. In other cases, an alternate name is given in parentheses. Economic and significant heavy metals are reported for each district, listed in order of decreasing abundance. Metals, shown by standard chemical symbols, represent metals or minerals recovered, but usually not in economic quantities. Type refers to the placer deposit type as determined by examining the description of the district and then classifying using one of the deposit types described above. Local bedrock describes the known or nearest outcrops of bedrock at or surrounding the placer district. Gold production, where known, is stated in grams (g). Production figures are from Cobb (1973) and Robinson and Bundtzen (1980). Gold concentration, where known, is stated in grams per cubic meter ($g/m^3$). Gold concentrations represent local values at specific mines or creeks, and are probably not typical of each district as a whole. Production values are queried (?) where uncertain.

### Abbreviations

Standard chemical symbols: for example, Au, gold; Cu, copper; Fe, iron; U, uranium

PGE: Platinum-group elements--minerals and alloys

REE: Rare-earth elements

mm, cm, m, km: millimeter, centimeter, meter, kilometer

g, kg, t: gram, kilogram, metric ton

$g/t$, $g/m^3$: grams per metric ton, grams per cubic meter

tonne: metric ton

%: percent

sq: square

### Conversion Factors

The following conversion factors were used to convert weight and volume from U.S. Customary to metric quantities:

1 cubic yard = 0.765 cubic meter

1 troy ounce per short ton = 34.29 grams per metric ton

1 part per million = 1 gram per metric ton

1 pound = 0.454 kilogram

1 troy ounce = 31.10 grams

1 short ton = 0.907 metric ton

1 flask (76.0 pounds mercury) = 34.7 kilograms

## SIGNIFICANT METALLIFEROUS LODE DEPOSITS, BROOKS RANGE

By Donald Grybeck and Warren J. Nokleberg, with contributions from James C. Barker, William P. Brosgé, Dennis P. Cox, John T. Dillon, Jeffrey Y. Foley, Murray W. Hitzman, Christopher D. Maars, Janet S. Modene, David W. Moore, Rainer J. Newberry, Joseph T. Plahuta, Charles M. Rubin, Jeanine M. Schmidt, and Loren E. Young

| MAP NUMBER. LATITUDE LONGITUDE | NAME. COMMODITIES | TYPE. GEOLOGIC HOST UNIT | TONNAGE AND GRADE. PRODUCTION, IF KNOWN |
|---|---|---|---|
| **SEDIMENTARY EXHALATIVE Zn-Pb, KUROKO MASSIVE SULFIDE, AND BEDDED BARITE DEPOSITS, NORTHWESTERN BROOKS RANGE** | | | |
| BR1. 68 12 163 07 | Lik. Zn, Pb, Ag | Sedimentary exhalative Zn-Pb. Mississippian and Pennsylvanian shale and chert | 25 million tonnes grading 8.8% Zn, 3.0% Pb, 34 g/t Ag |

DESCRIPTION: Disseminated and massive sphalerite, galena, pyrite, marcasite, and sparse barite in Mississippian and Pennsylvanian shale, chert, and quartz-exhalite of Kuna Formation. Main deposit in zone about 2,000 m long and up to 500 m downdip; additional sulfides along strike to north and south. Sulfide horizon varies from tabular to complexly folded. Long and sinuous zone of complex and brecciated textures, possibly a line of vents, occurs within center of deposit, parallel to strike. Host rocks and deposit extensively structurally imbricated with many subhorizontal thrust faults. SOURCES: Forrest, 1983; Forrest and others, 1984.

| | | | |
|---|---|---|---|
| BR2. 68 04 162 50 | Red Dog Creek. Zn, Pb, Ag, Ba | Sedimentary exhalative Zn-Pb. Mississippian and Pennsylvanian shale and chert | 85 million tonnes grading 17.1% Zn, 5% Pb, 82 g/t Ag |

DESCRIPTION: Disseminated and massive sphalerite, galena, pyrite, and barite in Mississippian and Pennsylvanian shale, chert, and silica exhalite of the Kuna Formation. Deposit is 1,600 m long and up to 150 m thick. Occurs near base of formation, locally subdivided into upper ore-bearing Ikalukrok unit and lower calcareous Kivalina unit (this study). Latter forms stratigraphic footwall for deposits. Barite-rich lenses up to 50 m thick locally cap deposit. Main occurrences are disseminated sulfides in organic-rich siliceous shale, coarse-grained sulfide veins, fine-grained fragmental-textured to indistinctly bedded sulfides, and silica exhalite lenses. Minor hydrothermal alteration: silicification and decarbonatization of shale. Small propylitically altered dioritic plug or hydrothermally altered pyroxene andesite flow occurs at north end of deposit. Host rocks and deposit extensively structurally imbricated with many subhorizontal thrust faults. Graywacke of the Cretaceous Okpikruak Formation structurally underlies deposit. SOURCES: Tailleur, 1970; Plahuta, 1978; Booth, 1983; Joseph T. Plahuta, L. E. Young, J. S. Modene, and David W. Moore, written commun., 1984; Lange and others, 1985; Moore and others, 1986.

| | | | |
|---|---|---|---|
| BR3. 68 24 159 54 | Nimiuktuk. Barite | Bedded barite. | About 1.5 million tonnes barite |

DESCRIPTION: Massive, nearly pure barite in small isolated hill about 7 to 10 m high, 40 m wide, and 60 m long. Stratigraphic contacts not exposed; nearest units are dark shale and chert of the Mississippian and Pennsylvanian Kuna Formation and shale and graywacke of the Lower Cretaceous Okpikruak Formation. Altered Mississippian(?) andesite crops out about 180 m from barite. Volume determined by gravity survey and model. SOURCES: Mayfield and others, 1979; Barnes and others, 1982.

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|---|---|---|---|
| BR4.<br>68 34<br>158 41 | Drenchwater.<br>Zn, Pb, Ag | Sedimentary exhalative Zn-Pb and (or) Kuroko massive sulfide. Mississippian shale, chert, tuff | Grab samples with >1% Zn, >2% Pb, 150 g/t Ag |

DESCRIPTION: Disseminated and massive sphalerite, galena, pyrite, and barite in Mississippian shale, chert, tuff, and quartz-exhalite of the Kagvik sequence. Locally abundant volcanic sandstone and keratophyre. Sulfides occur as disseminations in chert, disseminations and massive aggregates in quartz-exhalite, and as sparse, remobilized disseminations in sulfide-quartz veins crosscutting cleavage in shale and chert. Local extensive hydrothermal alteration of chert and shale with extensive replacement by kaolinite, montmorillonite, sericite, prehnite, fluorite, actinolite, chlorite, calcite, and quartz. Deposit up to 1,800 m long and up to 50 m thick. Host rocks and deposit extensively faulted and structurally imbricated with many thrust faults dipping moderately south. SOURCES: Tailleur and others, 1977; Nokleberg and Winkler, 1982; Lange and others, 1985.

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PODIFORM CHROMITE DEPOSITS, NORTHWESTERN BROOKS RANGE

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| BR5.<br>67 54<br>163 40 | Iyikrok Mountain Cr | Podiform chromite. Dunite and peridotite | Grab samples with up to 33% Cr, 0.2 g/t PGE. Estimated 130,000 to 350,000 tonnes chromite |

DESCRIPTION: Disseminated fine- to medium-grained chromite in Jurassic or older dunite and peridotite tectonite, locally serpentinized. Platinum observed in one sample Zones of chromite up to 90 m wide and 305 m long in dunite. Host rocks part of the Misheguk igneous sequence. Mafic and ultramafic rocks floored by major thrust fault. SOURCES: Mayfield and others, 1983; Foley and others, 1985, in press.

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| BR6.<br>68 20<br>161 52 | Avan.<br>Cr, PGE | Podiform chromite.<br>Dunite and harzburgite | Grab samples with up to 43% Cr, 0.48 g/t PGE. Estimated 290,000 to 600,000 tonnes chromite |

DESCRIPTION: Disseminated fine- to medium-grained chromite in Jurassic or older dunite and harzburgite tectonite, locally serpentinized. Part of dismembered ophiolite. Zones of chromite up to a few meters wide and a few hundred meters long in dunite. Intense minor folding of dunite and harzburgite layers. Host rocks part of the Misheguk igneous sequence. Mafic and ultramafic rocks floored by major thrust fault. SOURCES: Roeder and Mull, 1978; Degenhart and others, 1978; Zimmerman and Soustek, 1979; Mayfield and others, 1983; Foley and others, 1985, in press.

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| BR7.<br>68 15<br>161 05 | Misheguk Mountain.<br>Cr, PGE | Podiform chromite.<br>Dunite and peridotite | Grab samples with up to 27.5% Cr, <0.31 g/t PGE. Estimated 110,000 to 320,000 tonnes chromite |

DESCRIPTION: Disseminated fine- to medium-grained chromite in Jurassic or older dunite and peridotite tectonite, locally serpentinized. Part of dismembered ophiolite. Zones of chromite up to 31 by 107 m. Intense minor folding of dunite and harzburgite layers. SOURCES: Roeder and Mull, 1978; Degenhart and others, 1978; Zimmerman and Soustek, 1979; Foley and others, 1985, in press.

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| BR8.<br>68 20<br>158 30 | Siniktanneyak Mountain.<br>Cr, Ni, PGE | Podiform chromite.<br>Dunite and harzburgite | Grab samples with up to 21% Cr, 0.2% Ni, 0.07 g/t Pt, 0.1 g/t Pd. |

DESCRIPTION: Disseminated fine-grained chromite in discontinuous layers, pods, and wispy layers in Jurassic or older dunite and peridotite tectonite, locally serpentinized. Intense minor folding of dunite and peridotite layers. Host rocks part of the Misheguk igneous sequence. Mafic and ultramafic rocks floored by major thrust fault. SOURCES: Jansons and Baggs, 1980; Nelson and Nelson, 1982; Mayfield and others, 1983.

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## UNCLASSIFIED VEIN AND KIPUSHI Cu-Pb-Zn DEPOSITS, NORTHWESTERN BROOKS RANGE

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| BR9.<br>68 22<br>157 56 | Story Creek.<br>Pb, Zn, Ag, Au | (Pb-Zn-Au-Ag vein).<br>Mississippian sandstone, siltstone, and shale | Grab samples with up to 1.5 to 34% Pb, 1.5 to 50% Zn, 35 to 940 g/t Ag, and 1.2 g/t Au. |

DESCRIPTION: Crustified sphalerite and galena in crosscuting quartz veins occurring in tightly folded and faulted sandstone, siltstone, and shale of the Mississippian Kayak Shale; part of Brooks Range allochthon. Maximum width of float zone about 30 to 40 m. Discontinuous float and outcrops along a linear trend about 3,000 m long across tightly folded strata, indicating replacement origin in Late Jurassic or younger time. SOURCES: Ellersieck and others, 1982; Mayfield and others, 1983; Jeanine M. Schmidt and Inyo F. Ellersieck, written commun., 1985.

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|---|---|---|---|
| BR10.<br>68 14<br>157 51 | Whoopee Creek.<br>Zn, Ag, Au | (Zn-Ag-Au vein).<br>Mississippian sandstone, siltstone, and shale | Grab samples with up to 44% Zn, 458 g/t Ag, 4.4 g/t Au |

DESCRIPTION: Fracture zones containing siltstone breccia with matrix of galena, sphalerite, quartz and minor carbonate hosted in tightly folded and faulted sandstone, siltstone, and shale of the Mississippian Kayak Shale. Fracture zone about 6 m long. Discontinuous float or outcrops along a linear trend with minimum length of 1,500 m across tightly folded strata, indicating replacement origin in Late Jurassic or younger time. SOURCES: Ellersieck and others, 1982; I. F. Ellersieck, written commun., 1985.

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| BR11.<br>67 30<br>161 50 | Omar.<br>Cu, Pb, Zn, Ag, Co | Kipushi Cu-Pb-Zn.<br>Ordovician to Devonian dolomite and limestone | Grab samples with 15.3% Cu, 0.144% Pb, 0.95% Zn, 20 g/t Ag |

DESCRIPTION: Disseminated to massive chalcopyrite, bornite, lesser chalcocite, minor tennantite-tetrahedrite, very minor galena, supergene copper carbonates, and iron-oxide minerals occurring in veinlets, irregular stringers, or as blebs in brecciated host dolomite. Gangue of dolomite, calcite, and quartz with anomalously high Zn and Co. Sulfide zone about 3 km long occurs along northnorthwest-southsoutheast-trending fractures and veins. Local solution breccia. Local remobilization of sulfides into fractures. Local faulted and brecciated gossan. Host rocks of Ordovician to Devonian dolomite and limestone of the Baird Group; part of Kelly River allochthon. Host rocks strike northnortheast to southsoutheast; dips vary from gentle to vertical. Local isoclinal minor folds. SOURCES: Degenhart and others, 1978; Jansons, 1982; Mayfield and others, 1983; Inyo F. Ellersieck, written commun., 1985; Folger and Schmidt, 1986.

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|---|---|---|---|
| BR12.<br>67 28<br>161 35 | Frost<br>Cu, Zn, Pb, barite | (Cu-Zn-Pb-Ba vein).<br>Ordovician to Devonian dolomite and limestone | Up to 0.9 million tonnes barite; possible nine million tonnes. One vein with 13.2% Zn, 0.5% Cu, 21% barite |

DESCRIPTION: Chalcopyrite and galena in wavy quartz-calcite-barite veins, and lenses and pods of barite at least 30 m long by 10 m thick. Veins, lenses, and pods crosscut Ordovician to Devonian dolomite and limestone for minimum distance of 1.6 km. Calcite-barite veins locally enclose barite lenses. Host rocks part of the Baird Group. SOURCES: Degenhart and others, 1978; I. F. Ellersieck and J. M. Schmidt, written commun., 1985.

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## KUROKO MASSIVE SULFIDE, KIPUSHI Cu-Pb-Zn, AND STRATABOUND SULFIDE DEPOSITS, SOUTHERN BROOKS RANGE

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| BR13.<br>67 18<br>157 12 | Smucker (Ambler District).<br>Cu, Zn, Pb, Ag, Au | Kuroko massive sulfide.<br>Devonian and Mississippian metavolcanic and metasedimentary rocks | Grades of significant massive sulfides average 1 to 5% Pb, 5 to 10% Zn, 103 to 343 g/t Ag, minor Au |

DESCRIPTION: Stratiform disseminated fine- to medium-grained pyrite, sphalerite, galena, chalcopyrite, and owyheeite in a quartz-calcite-pyrite matrix. Strike length of 1,000 m and widths of up to 60 m. Deposit occurs on limb of recumbent, asymmetric antiform. Host rocks: a mafic and felsic metavolcanic sequence composed of quartz-muscovite-feldspar schist, quartz-chlorite-calcite phyllite, and porphyroclastic quartz-feldspar-muscovite schist; and an interlayered metasedimentary sequence composed of quartz-muscovite-chlorite phyllite, calc-schist, and marble. Host rocks derived from bimodal calcic and calc-alkaline volcanic rocks and impure clastic and calcareous sedimentary rocks. Host rocks part of the Devonian and Mississippian Ambler sequence. Greenschist-facies metamorphism of deposit and host rocks. Host rocks strike west-northwest, dip moderately south, and contain abundant south-dipping, tight to isoclinal folds. SOURCES: Charles M. Rubin, written commun., 1984; Rubin, 1984.

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| BR14.<br>67 11<br>156 22 | Arctic (Ambler District).<br>Zn, Cu, Pb, Ag, Au | Kuroko massive sulfide.<br>Devonian and Mississippian metavolcanic and metasedimentary rocks | 32 million tonnes grading 4.0% Cu, 5.5% Zn, 1.0% Pb, 51.4 g/t Ag, 0.65 g/t Au |

DESCRIPTION: Stratiform semimassive to massive chalcopyrite and sphalerite with lesser pyrite, minor pyrrhotite, galena, tetrahedrite, arsenopyrite, and traces of bornite, magnetite, and hematite. Deposit occurs in thick horizon with areal extent of about 900 by 1,050 m, and in two thinner horizons above main horizon. Sulfides occur in multiple lenses up to 15 m thick over vertical interval of 6 to 80 m. Main horizon hosted in mainly graphitic pelitic schist and metarhyolite porphyry derived from submarine ash-flow tuff. Host rocks part of the Devonian and Mississippian Ambler sequence. Gangue of mainly calcite, dolomite, barite, quartz, and mica. Local abundant chlorite, phlogopite-talc-barite, and pyrite-calcite-white mica alterations. SOURCES: Wiltse, 1975; Sichermann and others, 1976; Hitzman and others, 1982; Schmidt, 1983; Jeanine Schmidt, written commun., 1984; Schmidt, 1986.

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| BR15.<br>67 08<br>155 52 | BT, Jerri Creek (Ambler District).<br>Cu, Zn, Pb, Ag | Kuroko massive sulfide.<br>Devonian and Mississippian metavolcanic and metasedimentary rocks | No data |

DESCRIPTION: BT deposit: disseminated to massive pyrite, chalcopyrite, sphalerite, galena, and gossan in layers 5 to 12 cm thick. Sparse tennantite and possible enargite. Gangue quartz, muscovite, and barium feldspar in massive sulfide zones. No vertical zonation. Hosted in Devonian and Mississipian pelitic schist, calc-schist, and metarhyolite ("button") schist, part of the Ambler sequence. Strike length of 2,000 m; average width of 1.5 m. Layering strikes east-west and dips 50° to 70° south. Similar occurrences in zone up to 10 km long to west, along same stratigraphic horizon. Jerri Creek deposit: Mainly

disseminated and sparse massive pyrite, sphalerite, and minor chalcopyrite in layers up to 2 cm thick. Hosted in muscovite-quartz schist, actinolite-garnet-quartz schist, and marble adjacent to metarhyolite, all part of the Devonian and Mississippian Ambler sequence. Strike length of 20 km. SOURCES: Hitzman, 1978, 1981.

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| BR16.<br>67 04<br>156 59 | Ruby Creek (Bornite - Ambler District).<br>Cu, Co, Zn, Ag | Kipushi Cu-Pb-Zn.<br>Devonian dolomite and phyllite | 91 million tonnes grading 1.2% Cu; 4.2 million tonnes grading up to 4% Cu |

DESCRIPTION: Stratabound disseminated to massive chalcopyrite, bornite, chalcocite, pyrite, and local sphalerite occurring in brecciated dolomite and metamorphosed calcareous sedimentary rocks, part of the Devonian Bornite Marble (Hitzman and others, 1982). Local sparse carrolite, chalcopyrite, reinerite, galena, pyrrhotite, and marcasite. Large masses of dolomite breccia in matrix of dolomite, calcite, or fine-grained pyrite. Pyrite breccia matrix locally replaced by Cu-, Zn-, and Co-sulfides. Individual zoned sulfide bodies with interior bornite, chalcocite, and carrollite, middle bornite, and chalcopyrite, and exterior chalcopyrite, pyrite, and peripheral pyrite. Broadly folded. Greenschist-facies metamorphism. Extensively mineralized hydrothermal dolostone bodies with biohermal and backreef facies. Local extensive clasts of hydrothermal dolostone in breccias, possibly synsedimentary, indicating possible coeval mineralization and sedimentation. Three major hydrothermal dolomite formation events. Subsequent intense polymetamorphism and deformation. SOURCES: Runnels, 1969; Sichermann and others, 1976; Hitzman and others, 1982; Hitzman, 1983; M. W. Hitzman, written commun., 1984; Bernstein and Cox, 1986; Hitzman, 1986.

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| BR17.<br>67 04<br>155 01 | Sun (Picnic Creek - Ambler District).<br>Cu, Zn, Pb, Ag, Au | Kuroko massive sulfide.<br>Devonian and Mississippian metavolcanic and metasedimentary rocks | Average grades of 1 to 4% Pb, 6 to 12% Zn, 0.5 to 7% Cu, 103 to 343 g/t Ag. Single quartz-barite beds with 685 to 1,029 g/t Ag |

DESCRIPTION: Stratiform, disseminated to massive sphalerite, chalcopyrite, galena, and argentiferous tetrahedrite in gangue pyrite, arsenopyrite, and barite. Deposit occurs in at least three zoned horizons. Upper horizon is Zn-Pb-Ag rich; middle is mainly Cu-rich; lower is Cu-Zn rich. Hosted in metarhyolite, muscovite-quartz-feldspar schist, micaceous calc-schist, marble, and greenstone, all part of the Devonian and Mississippian Ambler sequence. Host rocks generally strike northeast-southwest and dip moderately southeast. Locally well-developed layering in metarhyolite may represent original bedding in tuff protolith. Bulk of sulfides in felsic schist; thin concordant beds of sulfides in metarhyolite. Small- and large-scale isoclinal folds in host rocks and sulfide layers. SOURCES: Zdepski, 1980; Christopher D. Maars, written commun., 1984.

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| BR18.<br>67 25<br>152 50 | Ann.<br>(Ernie Lake).<br>Pb, Zn, Ag | Polymetallic vein or metamorphosed sulfide.<br>Late Proterozoic(?) metasedimentary rocks | No data |

DESCRIPTION: Vein and stratabound massive galena with lesser sphalerite, bornite, chalcopyrite, and alteration malachite and azurite in marble, calc-schist, and pelitic schist. Hosted in Late Proterozoic(?) banded schist and paragneiss. Deposit occurs adjacent to the granite pluton of Ernie Lake, along with nearby smaller occurrences around periphery of pluton. Deposit may be polymetallic vein, or remobilized stratabound deposit. SOURCES: Grybeck, 1977; John T. Dillon, oral commun., 1986.

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| BR19.<br>67 10<br>152 30 | Roosevelt Creek.<br>Cu, Zn, Pb, Ag, Au | Kuroko massive sulfide.<br>Devonian metavolcanic rocks and pelitic schist | No data |

DESCRIPTION: Disseminated(?) and massive sulfides, probably mainly chalcopyrite, sphalerite, and galena, in metavolcanic rocks and pelitic schist and marble of the Devonian and Mississippian Ambler sequence. SOURCES: Grybeck, 1977; William P. Brosge and John T. Dillon, oral commun., 1986.

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| BR20.<br>67 19<br>151 14 | Michigan Creek.<br>As, Au, Ag, Cu, Zn, Pb | Kuroko massive sulfide.<br>Devonian felsic schist, marble, and phyllite | Grab samples with up to 8.2% As, 8.3 g/t Au, 3.9 g/t Ag, 0.14% Cu, 0.03% Zn, 0.014% Pb |

DESCRIPTION: Disseminated to massive chalcopyrite and argentiferous galena up to 0.1 m thick in felsic schist and crosscutting pyrite veins. Hosted in felsic schist, marble, and phyllite of the Devonian and Mississippian Ambler sequence. SOURCES: Dillon and others, 1981; William P. Brosge and John T. Dillon, oral commun., 1986.

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## POLYMETALLIC VEIN, Au QUARTZ VEIN, Sb-Au VEIN, Cu-Pb-Zn AND Sn SKARN, PORPHYRY Cu AND Mo DEPOSITS, CENTRAL BROOKS RANGE

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| BR21.<br>67 15 to 37<br>154 00 to 15 | Mount Igikpak and Arrigetch Peaks.<br>Cu, Pb, Zn, Ag, Au, Sn, W, As | Polymetallic vein, Au quartz vein, Sn skarn,<br>Cu-Pb-Zn skarn. Silurian and Devonian or older pelitic schist, calcschist and marble | Grab samples with up to 55 g/t Au, 150 g/t Ag, 0.6% Pb, 0.8 % Zn, >0.18% Sn, 0.03% W, 0.03% Cu, 0.5% As |

DESCRIPTION: Numerous polymetallic vein, Au quartz vein, and skarn deposits in Silurian and Devonian or older metasedimentary rocks adjacent to schistose Devonian granitic plutons. Most common deposits are: (1) quartz veins with varying amounts of galena, sphalerite, and chalcopyrite; (2) Sn skarns with disseminated cassiterite, magnetite, chalcopyrite, arsenopyrite, and gangue of garnet, diopside, hornblende, clinozoisite, and idocrase; (3) Cu-Pb-Zn skarns with vein or sparse disseminated pyrrhotite, pyrite, chalcopyrite, galena, sphalerite, arsenopyrite, and fluorite with similar gangue as Sn skarns; and (4) areas of Fe-stained wall rocks with molybdenite and fluorite. Wallrocks mainly Silurian and Devonian Skajit Limestone or older metasedimentary rocks. SOURCES: Grybeck and Nelson, 1981; Newberry and others, 1986.

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| BR22.<br>67 36<br>149 50 | Sukakpak Mountain.<br>Au, Sb, Hg, Mo | Sb-Au vein. Devonian marble, dolomite, and quartz schist | Grab samples with up to 560 g/t Au, 4.5 g/t Ag, 54% Sb, 1.7% Mo, 0.50% Hg |

DESCRIPTION: Sparse disseminated stibnite, cinnabar, gold, and molybdenite(?) in three stibnite quartz veins occurring along high-angle fault in Devonian marble, dolomite, graphitic and calcareous quartz schist. Stibnite forms 30 to 60 percent of vein. Quartz gangue contains about 10 percent calcite. Length of veins about 1 km. Maximum width of zone of veins about 100 m. Local slickenslides and boudins in veins suggest possible emplacement during movement on fault. SOURCE: Dillon, 1982.

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| BR23.<br>67 38<br>149 20 | Victor, Venus, Evelyn Lee, and Ebo.<br>Cu, Ag, Mo | Porphyry Cu and Cu skarn. Devonian schistose granodiorite. Silurian and Devonian or older marble, calc-schist, and pelitic schist | Zones in granitic rocks up to 30 m wide with up to 0.4% Cu. Grab samples of skarn with up to 5.5% Cu, 0.41 g/t Au, 0.29 g/t Ag |

DESCRIPTION: Veinlet and disseminated chalcopyrite, bornite, molybdenite, and pyrite in schistose Devonian granodiorite porphyry intruding Silurian and Devonian or older marble, calc-schist, and pelitic schist. Skarn in marble adjacent to plutons with vugs and interstitial bornite, chalcopyrite, bornite, chalcocite, pyrite, magnetite, and some digenite in skarn of mainly garnet, magnetite, diopside, and retrograde vein and replacement epidote, amphibole, chlorite, calcite, and quartz. Skarns regionally metamorphosed. Wall rocks mainly the Silurian and Devonian Skajit Limestone or older calcareous metasedimentary rocks. SOURCES: DeYoung, 1978; Donald Grybeck, written commun., 1984; Newberry and others, in press.

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| BR24.<br>67 45<br>149 05 | Jim-Montana.<br>Cu, Zn, Ag, Pb | Cu-Zn skarn.<br>Silurian and Devonian marble and calc-schist | No data |

DESCRIPTION: Disseminated chalcopyrite, sphalerite, and minor galena, tennantite, and malachite stain in skarn in the Silurian and Devonian Skajit Limestone, mainly marble. SOURCES: Grybeck, 1977; DeYoung, 1978.

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| BR25.<br>67 41<br>148 49 | Geroe Creek.<br>Cu, Mo | Porphyry Cu-Mo.<br>Devonian granodiorite plutons | Zones in plutons up to several m thick with up to 0.6% Cu, 0.02% Mo, and 0.1 g/t Au. |

DESCRIPTION: Veinlet, stockwork, and disseminated molybdenite, chalcopyrite, and pyrite with gangue of quartz, sericite, and chlorite in the Devonian Horace Mountain and Baby Creek plutons composed of metaluminous biotite-hornblende granite with local porphyritic phases. Wallrocks mainly the Silurian and Devonian Skajit Limestone and older calcareous metasedimentary rocks. SOURCES: DeYoung, 1978; Newberry and others, in press.

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| BR26.<br>67 32<br>148 15 | Chandalar district (Mikado, Little Squaw.<br>Au | Au quartz vein. Devonian or older pelitic schist, phyllite, quartzite, and schistose Devonian granitic plutons | 12,000 tonnes grading 75 g/t Au at Mikado and Little mine. Estimated 45,000 tonnes grading 80 g/t Au for distict |

DESCRIPTION: Sparse gold and disseminated arsenopyrite, galena, sphalerite, stibnite, and pyrite in several quartz veins up to 3 m thick in a zone about 4.0 km long and 1.6 km wide. Veins occur along steeply dipping normal faults in quartz-muscovite schist, phyllite, and quartzite. Veins interpreted to have been emplaced during fault movement. Late Proterozoic age, intruded by Devonian(?) schistose plutonic rocks. More than 1,000 m of underground workings at Little Squaw and Mikado mines. SOURCES: Chipp, 1970; DeYoung, 1978; Dillon, 1982; Ashworth, 1983; John T. Dillon, oral commun., 1986.

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| BR27.<br>69 18<br>145 15 | Esotuk Glacier.<br>Pb, Zn, Sn, Cu, W | Pb-Zn skarn and fluorite vein. Devonian or older marble and calc-schist | Grab samples with up to 0.03% Sn, 0.15% W |

DESCRIPTION: Disseminated galena, sphalerite, malachite, cassiterite, and axinite in skarn in Devonian or older marble and calc-schist intruded by Devonian gneissose granite. Sparse quartz-tourmaline veins. SOURCES: Grybeck, 1977; W. P. Brosgé, oral commun., 1984; Rainer Newberry, written commun., 1985.

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| BR28.<br>68 48<br>146 27 | Porcupine Lake.<br>Cu, Zn, Ag, F | Polymetallic vein(?). Mississippian and Pennsylvanian tuffaceous limestone | Grab samples with up to 4.8% Cu, 0.6% Zn, 0.2% Ag |

DESCRIPTION: Tetrahedrite, enargite, and fluorite in a silica gangue in veins and replacements. Hosted in tuffaceous silicified limestone and minor chert breccia of the Mississippian and Pennsylvanian Lisburne Group, about 80 m below contact with the overlying Sadlerochit Group. Distribution of veins and replacements in breccias highly variable. Area of most intense veins and replacement occurs intermittently along strike for nearly 1.6 km, and up to about 2.4 m thick. Veins crosscut bedding at low angles. About 3 to 5 km to north, stratabound, disseminated fluorite occurs in veins and replacements along strike for several kilometers. Veins up to 0.9 m thick. Fluorite content ranges from 1% to >90%. Fluorite veins and replacements occur within a few meters of top of the Lisburne Group, near contact with the overlying Sadlerochit Group. SOURCES: Barker, 1978, 1981.

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| BR29.<br>69 18<br>143 50 | Romanzof Mountains.<br>Cu, Zn, Pb, Mo, Sn, Ag, U, F | Polymetallic vein, Pb-Zn and possible Sn skarn. Devonian(?) granite and older marble | Grab samples with up to 0.15% Sn |

DESCRIPTION: Numerous disseminated polymetallic sulfides in Devonian(?) granite, Pb-Zn skarns, and quartz veins. Local fluorite greisen. Skarn and quartz veins hosted in Precambrian marble and calc-schist of the Neruokpuk Quartzite intruded by the Silurian or Early Devonian Okpilak (granite) batholith. Most common occurrences are: (1) disseminated galena, sphalerite, chalcopyrite and pyrite zones, locally with Au and Ag, in granite; (2) skarn in marble with disseminated magnetite, pyrite, pyrrhotite, sphalerite, and galena in gangue of carbonate, clinopyroxene, epidote, amphibole, beryl, tourmaline, and fluorite; (3) disseminated galena, sphalerite, chalcopyrite, and (or) molybdenite in quartz veins along sheared contact in granite; and (4) fluorite greisen in granite. SOURCES: Brosge and Reiser, 1968; Grybeck, 1977; Sable, 1977; W. P. Brosgé, oral commun., 1984; Newberry and others, in press.

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| BR30.<br>68 23<br>142 11 | Bear Mountain.<br>Mo, W | Porphyry Mo. Tertiary rhyolite porphyry | Grab samples with up to 0.8% Mo and 0.6% W |

DESCRIPTION: Molybdenite-wolframite-bearing Tertiary rhyolite porphyry stock with pipe-shaped core of intrusive breccia intrudes Mississippian and older metasedimentary rocks. Stock located near perimeter of the early Tertiary granite pluton of Bear Mountain. Local rhyolite porphyry dikes and quartz porphyry. Local gossan with molybdenite and galena. Zonal alteration pattern with core of sericitic and argillic alteration and outer zone of silicification. Local halo of pyrite and propylitic alteration along margin of porphyry. Exposed area approximately 1 km in diameter. Igneous rocks near Bear Mountain intrude Devonian and Mississippian sedimentary rocks, and Devonian or older metasedimentary rocks of the Neruokpuk(?) Quartzite. SOURCE: Barker and Swainbank, 1985, 1986.

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| BR31.<br>68 23<br>142 02 | Galena Creek.<br>Cu, Zn, Pb, Ag | Polymetallic vein.<br>Devonian or older<br>quartzite and marble | Grab samples with up to 21%<br>Cu, 3.5% Zn, 1.3% Pb, 170<br>g/t Ag |

DESCRIPTION: Disseminated galena, sphalerite, malachite, and barite in quartz veinlets and replacements. Hosted in phyllite, siltstone, and greenstone of Neruokpuk(?) Quartzite of Devonian or older age. Area of veinlets and replacements on ridge west of creek about 760 by 1,060 m. Vein system on east side of creek up to about 2 m wide and 454 m long. Local alteration of phyllite to chlorite, epidote, and calcite. Local malachite staining in greenstone. Local abundant early Tertiary rhyolite dikes. Local hematite and rare kaolinite alteration of granite pluton and rhyolite breccia to east. SOURCES: Brosgé and Reiser, 1968; R. C. Swainbank, in Barker, 1981.

## SIGNIFICANT METALLIFEROUS LODE DEPOSITS, SEWARD PENINSULA

By Bruce M. Gamble, Warren J. Nokleberg, and Donald Grybeck, with contributions from Roger P. Ashley, Joseph A. Briskey, Christopher C. Puchner, and Alison B. Till

| MAP NUMBER.<br>LATITUDE<br>LONGITUDE | NAME.<br>COMMODITIES | TYPE.<br>GEOLOGIC HOST UNIT | TONNAGE AND GRADE.<br>PRODUCTION, IF KNOWN |
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| | | **Sn VEIN, SKARN, AND GREISEN DEPOSITS** | |
| SP1.<br>65 35<br>168 00 | Cape Mountain.<br>Sn, W | Sn vein. Margin and dikes of granitic pluton intruding Mississippian limestone and shale | Produced several hundred tonnes Sn |

DESCRIPTION: Cassiterite, tourmaline, pyrite, pyrrhotite, fluorite, scapolite, sphalerite, and scheelite along margin of Cretaceous granite. Deposits occur in periphery of pluton, dikes, contact-metamorphosed and contact-metasomatized wall rocks, and quartz veins in pluton. Cassiterite also occurs as replacement of limestone near intrusive contact. Granite intrudes Mississippian limestone, dolomitic limestone, and shale. Age of granite 78.8 m.y. Several small prospects and one small mine. Main production from 1903 to 1909. About 9 tonnes cassiterite concentrate shipped in 1906. About 1 to 2 tonnes ore produced in 1983. Probable source for Goodwin Gulch and Tin City cassiterite placer deposits. SOURCES: Knopf, 1908; Steidtman and Cathcart, 1922; Mulligan, 1966; Hudson and Arth, 1983; J. Dean Warner, written commun., 1987.

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| SP2.<br>63 38<br>167 35 | Potato Mountain.<br>Sn | Sn vein.<br>Precambrian or early Paleozoic phyllite | Up to a few percent Sn |

DESCRIPTION: Irregular stockwork of veins and veinlets of quartz, clay, cassiterite, pyrite, and arsenopyrite associated with altered tin- and tourmaline-bearing Precambrian or lower Paleozoic carbonaceous phyllite, metasiltstone, and slate, all part of slate of the York region. Gravity data indicate an intrusive body lying within 0.5 km of surface. One granitic dike exposed. Placer cassiterite mined from streams draining area. SOURCES: Steidtman and Cathcart, 1922; Sainsbury, 1969; Hudson and others, 1977; Bruce M. Gamble, written commun., 1986.

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| SP5.<br>65 28<br>167 10 | Lost River.<br>Sn, W, F, Be, Zn<br>Cu, Pb, Ag | Sn-W skarn, Sn greisen.<br>Ordovician limestone intruded by Late Cretaceous granite | Estimated 25 million tonnes grading 0.15% Sn, 0.03% $WO_3$, 16.3% $CaF_2$. Produced 320 tonnes Sn |

DESCRIPTION: Several deposits and one mine in vein skarn, greisen, and intrusion breccia formed near and along margin of shallow Late Cretaceous granite stock intruding thick sequence of Lower Ordovician limestone and argillaceous limestone. Early-stage andradite-idocrase skarn and later fluorite-magnetite-idocrase vein skarns altered to chlorite-carbonate assemblages that are contemporaneous with greisen formation and cassiterite deposition. Locally abdundant beryllium deposits hosted in fluorite-white mica veins that contain diaspore, chrysoberyl, and tourmaline; probably associated with early stages of granite intrusion. Major ore minerals in skarns and greisen are cassiterite and wolframite along with lesser stannite, galena, sphalerite, pyrite, chalcopyrite, arsenopyrite, and molybdenite and a wide variety of other contact metamorphic and alteration minerals. Age of granite 80.2 m.y. Production mostly from 1952 to 1955 from underground workings a few hundred meters deep. Most of ore from the Cassiterite dike, a near-vertical granite dike extensively altered to greisen. Similar smaller deposits nearby include tin-greisen and veins near the Tin Creek Granite and various polymetallic veins and skarns near the Brooks Mountain Granite. SOURCES: Steidtman and Cathcart, 1922;

Sainsbury, 1963, 1964, 1965, 1969; WGM, Incorporated, Anchorage, written commun., 1973; Dobson, 1982; Hudson and Arth, 1983.

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| SP4.<br>65 56<br>166 12 | Ear Mountain area.<br>(Winfield)<br>Sn, Cu, Ag, Pb, Zn | Sn skarn. Argillaceous limestone intruded by Late Cretaceous granite | Produced several hundred tonnes Sn |

DESCRIPTION: Cassiterite, stannite, and chalcopyrite in skarn and sparse cassiterite-quartz veins along margin of Late Cretaceous multistage biotite granite stock intruded into argillaceous limestone. Highly variable contact metamorphic silicate and sulfide mineral assemblages. Tourmaline-quartz greisen veins in upper part of granite. Local occurrence of U in oxidized tourmalinized mafic dike and adjacent biotite granite. Deposit associated with with late-magmatic stage of Late Cretaceous granite. Age of granite about 76.7 m.y. SOURCES: Killeen and Ordway, 1955; Mulligan, 1959; Sainsbury, 1972; Hudson and others, 1977; Bond, 1983; Hudson and Arth, 1983.

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| SP5.<br>65 41<br>165 14 | Kougarok.<br>Sn, Ta, Nb | Sn greisen with Ta and Nb. Cretaceous dikes, sills, plugs | Grades range from 0.1 to 15% Sn; average about 0.5% Sn; 0.01% Ta and Nb each |

DESCRIPTION: Disseminated cassiterite in quartz-tourmaline-topaz greisen, and subjacent or adjacent disseminated tantalite-columbite in quartz-white mica greisen. Sn deposits occur in steep cylindrical pipes of greisenized granite, greisensized dikes, in greisen along roof zone of subhorizontal granite sills, and as stockwork veinlets in schist. Hosted in Late Cretaceous granite dikes, sills, and plugs intruding poly-deformed graphitic and calcareous quartz schist. Wallrocks part of the undifferentiated Nome Group (Sainsbury, 1972), probably equivalent to the pelitic schist unit of Till (1984). Nearby Cretaceous Sn-bearing granitic plutons. SOURCES: Hudson and Arth, 1983; Christopher C. Puchner, written commun., 1984; Puchner, 1985, 1986.

## POLYMETALLIC VEIN AND PORPHYRY Mo DEPOSITS

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| SP6.<br>65 48<br>164 32 | Serpentine Hot Springs.<br>Pb, Zn, As, Ag, Au, Sn | Polymetallic vein. Veins and stringers in Paleozoic(?) quartz-mica schist near Cretaceous granitic pluton | No data |

DESCRIPTION: Veins, stringers, and disseminations of limonite, generally pyrite and possibly minor chalcopyrite, and argentiferous galena in quartz in Paleozoic(?) schist composed of varying proportions of quartz, muscovite, chlorite, chloritoid, graphite, pyrite, pyrrhotite, and albite at Midnight, Humboldt, and Ferndale Creeks. Schist part of the mixed unit of Till (1984). Local sparse granitic to rhyolitic dikes containing disseminated pyrite and fluorite. Deposit within 5 km of southeast margin of the Sn-bearing Cretaceous Oonatut Granite Complex. Deposit exposed in trenches cut along northwest- or east-trending faults. SOURCES: Hudson and others, 1977; Joseph A. Briskey, written commun., 1985.

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| SP7.<br>65 02<br>162 41 | Omilak area.<br>Pb, Zn, Ag, Sb, Au, Cu, Sn, As | Polymetallic vein. Paleozoic(?) marble, feldspathic schist | About 300 tonnes Au-Pb ore averaging about 73% Pb and 5,000 g/t Ag produced from Omilak mine |

DESCRIPTION: The Omilak area contains the Omilak mine and two prospects at Foster and Omilak East. Deposits in the area consist of lenses of argentiferous galena at the Omilak mine, and veins and gossans containing argentiferous galena, cerrusite, anglesite, pyrite, arsenopyrite, and traces of chalcopyrite, together with highly variable amounts of calcite, dolomite, tremolite, wollastonite, and other calc-silicate minerals. Veinlets and flat lenses of stibnite also occur at the Omilak mine. Veins and gossan occur along axes and limbs of northwest-plunging folds in marble, and in graphitic, pyrite-feldspar schist,

and micaceous schist. Bleaching and silicification associated with veins and gossan. Small occurrences are found in an area extending about 12.6 km north from Omilak to the Windy Creek pluton. Workings at Omilak mine consist of 55-m-deep shaft, 150-m-long adit, and two working levels. Limited underground exploration prior to 1930. Production between 1881 and 1890. SOURCES: Smith and Eakin, 1911; Herreid, 1965b; Mulligan, 1962; Hudson and others, 1977; Joseph A. Briskey, written commun., 1985; Bruce M. Gamble and Alison B. Till, written commun., 1986.

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| SP8.<br>65 10<br>162 37 | Windy Creek.<br>Mo, Pb, Zn | Porphyry Mo. Dikes and quartz vein in and near granitic pluton intruding pelitic schist, sparse marble | Grab samples with up to 0.15% Mo, 0.05% Sn, 0.05% W, 0.15% Pb |

DESCRIPTION: Veins and stringers of quartz, pyrrhotite, pyrite, fluorite, molybdenite, galena, and spalerite in hornblende granite of the Cretaceous(?) Windy Creek pluton. Molybdenite reported in skarn along pluton margin. Sporadic stringers and veinlets of quartz containing pyrrhotite, pyrite, and fluorite occur near dikes of altered biotite granodiorite intruding granite. Wallrocks part of the lower Paleozoic mafic schist, and schist and marble of the mixed unit of Till (1984). SOURCES: Miller and others, 1971; Hudson and others, 1977; Joseph A. Briskey, written commun., 1984.

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| SP9.<br>65 41<br>162 28 | Independence.<br>Pb, Ag, Zn | Polymetallic vein. Paleozoic micaceous marble | Up to 30% Pb, 5,145 g/t Ag, 3.4 g/t Au. Dump specimens average 20% Pb and 686 g/t Ag. Produced a few hundred tonnes ore |

DESCRIPTION: Mainly oxidized pyrite, galena, sphalerite, and minor tetradedrite in a vein composed primarily of limonite and sheared calcite. Vein localized in a fault zone trending nearly north-south. Host rocks are sheared and schistose, micaceous and banded, Paleozoic marble and Cretaceous granitic pluton crop out about 4 km to the northwest. Deposit exposed in open cuts with a width of 2 to 4 m and length of 600 m. Production in 1921 and 1922. A few hundred meters of underground workings. SOURCES: Hudson and others, 1977; Joseph A. Briskey, written commun., 1985.

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## Au QUARTZ VEIN DEPOSITS

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| SP10.<br>64 40<br>165 28 | Nome district.<br>Au | Au quartz vein. Paleozoic metasedimentary rocks and mafic schist | Grab samples with up to 120 g/t Au, 10 g/t Ag, >0.2% As, >0.1% Sb |

DESCRIPTION: Quartz veins along high-angle faults with disseminated gold, arsenopyrite, and sparse pyrite in gangue of quartz, minor carbonate, and plagioclase. Minor chalcopyrite, sphalerite, galena, stibnite, tetrahedrite, and scheelite. Veins range from 2 cm to 1 m wide, most less than 10 cm wide. Local veins contain up to 50 percent stibnite and minor pyrite. District includes MacDuffie, Sliscovitch, California Gulch, and Stipec, and Kotovic deposits. Faults in two regional sets trending northeast and northwest. Veins and faults occur in the mixed unit of Till (1984) and Gamble and others (1985) (metasedimentary rocks) and mafic schist of the Nome Group. Late Jurassic or Early Cretaceous age estimated for regional metamorphism and vein formation in waning stages of metamorphism. SOURCES: Smith, 1910; Cathcart, 1922; Gamble and others, 1985.

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| SP11.<br>64 39<br>164 14 | Big Hurrah.<br>Au | Au quartz vein.<br>Paleozoic metasedimentary rocks | Ore averaging 34.3 g/t Au.<br>Recent assays of 25 to 65 g/t Au. Produced about 155,500 g gold |

DESCRIPTION: Four major quartz veins, and zones of ribbon quartz 1 to 5 m thick and a few hundred meters long with gold, pyrite, and arsenopyrite, minor scheelite, chalcopyrite, and sphalerite in gangue of quartz, carbonate, and feldspar. Older, concordant, non-Au-bearing metamorphic quartz veins. Au-bearing veins range from discordant tension veins to discontinuous quartz lodes that occur in shear zones crossing foliation. Au-bearing veins range from 0.5 to 5 m wide, with minimum depth of 90 m. Most veins are less than 1 m wide. Veins and zones occur in quartz-rich graphitic quartz-mica schist or quartzite of the Nome Group (mixed unit of Till, 1984). Up to 15 percent arsenopyrite occurs in one vein. Late Jurassic or Early Cretaceous age estimated for regional metamorphism. Veins intepreted to have formed during shearing and uplift associated with metamorphic dehydration. Production from from 1903 to 1909, and 1953-1954. Shaft workings to 75 m deep; about 550 m of underground workings. SOURCES: Collier and others, 1908; Cathcart, 1922; Asher, 1969; Mullen, 1984; Gamble and others, 1985; Read, 1985; Read and Meinert, 1986.

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| SP12.<br>64 34<br>163 44 | Daniels Creek (Bluff).<br>Au | Au quartz vein.<br>Paleozoic metasedimentary rocks | Grab samples with 4 to 40 g/t Au, 10 g/t Ag, 4.8% As, >0.1% Sb |

DESCRIPTION: Discontinuous arsenopyrite-pyrite quartz pods and veins in zone up to 1.6 km long in series of faults in Paleozoic marble and interfoliated quartz-mica-feldspar schists of the Nome Group (mixed unit of Till, 1984). Veins up to 75 cm wide. Interstitial native gold in arsenopyrite-rich fractions. Two quartz veins contain up to 60 percent arsenopyrite. Late Jurassic or Early Cretaceous age estimated for regional metamorphism and vein formation in waning stages of metamorphism. Minor underground workings; negligible production. Probable source of gold for nearby Daniels Creek placer deposit and marine placers. SOURCES: Herreid, 1965a; Mulligan, 1971; Hudson and others, 1977; Gamble and others, 1985.

## U AND METAMORPHOSED SULFIDE DEPOSITS

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| SP13.<br>64 42<br>162 46 | Eagle Creek.<br>U, Th, REE | Felsic plutonic U.<br>Cretaceous granitic rocks | Grab samples of float with up to 0.15% $U_3O_8$, 1.05% Th, and 2% REE |

DESCRIPTION: U-, Th-, and REE-minerals disseminated along margins of alkaline (pulaskite) dikes intruded into Cretaceous Kachauik granitic pluton, marble, and schist. Idocrase principal U-, Th-, and REE-bearing mineral. Local numerous occurrences of U- and Th-minerals in stream-sediment samples underlain by the nearby Darby pluton (granite). SOURCES: West, 1953; Miller and others, 1976; Miller and Bunker, 1976.

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| SP14.<br>65 03<br>162 15 | Death Valley.<br>U | Sandstone U.<br>Cenozoic flysch | Average grade of 0.27% $U_3O_8$.<br>Estimated 450,000 kg uranium oxide |

DESCRIPTION: Mainly meta-autunite in Paleocene continental sandstone. Sandstone occurs in marginal facies of a Tertiary sedimentary basin where nearshore coarse arkosic clasts are interbedded with coal and lacustrine deposits. Interpreted as probably forming when uranium-bearing oxidized groundwater moved down gradient from Cretaceous granitic plutons to west. U precipitated in reducing environment of coal layers. Age of deposit estimated at middle or late Tertiary. SOURCE: Dickinson and Cunningham, 1984.

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| SP15.<br>65 56<br>163 21 | Hannum Creek<br>Pb, Zn, Ag | Metamorphosed sulfide.<br>Paleozoic marble and quartzite | Up to 10% Pb, 2.2% Zn, 1.4 g/t Au, 60.4 g/t Ag |

DESCRIPTION: Blebs, stringers, massive boulders, and disseminations of galena, pyrite, sphalerite, and barite with gangue of quartz, calcite, and limonite in Paleozoic micaceous quartzite, marble, and quartz-mica-graphitic schist, all within or near exposures of crudely banded micaceous quartzite enclosed in an isolated lens of marble. Marble contained with early Paleozoic quartz-mica-graphite schist, part of mixed unit of Till (1984). Deposit is highly oxidized; exposure is poor. Zones of blebs, stringers, and disseminations appear conformable with bedding and banding in quartzite. Zones up to 90 m wide and extend for about 2 km along northwest-southeast trend. On strike about 2 km farther southeast are oxidized stringer zones or lenses of pervasive limonite, quartz, and chlorite that are cut by veins and stockworks of quartz and chlorite. Stringer zones and lenses composed of interlayered marble and calcareous quartz-muscovite schist. Quartzite is interpreted as metamorphosed laminated exhalite, possibly a sedimentary exhalative Zn-Pb deposit. Local lenses of marble interpreted as former limestone mounds that formed near exhalative vents. SOURCES: Herreid, 1965b; Joseph A. Briskey, written commun., 1985.

## SIGNIFICANT METALLIFEROUS LODE DEPOSITS, WEST-CENTRAL ALASKA

By Thomas K. Bundtzen and Warren J. Nokleberg, with contributions from Jeffery Y. Foley, Brian K. Jones, William Morgan, Harold Noyes, William W. Patton, Jr., Mark S. Robinson, and Thomas E. Smith

| MAP NUMBER. LATITUDE LONGITUDE | NAME. COMMODITIES | TYPE. GEOLOGIC HOST UNIT | TONNAGE AND GRADE. PRODUCTION, IF KNOWN |
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| | | **Sb-Hg VEIN, ZONED MAFIC-ULTRAMAFIC, AND HOTSPRING Hg DEPOSITS, SOUTHWESTERN KUSKOKWIM MOUNTAINS REGION** | |
| WC1. 59 52 159 54 | Kagati Lake. Sb, Hg | (Sb-Hg vein). Cretaceous monzonite and granodiorite stock | No data; minor production |

DESCRIPTION: Stibnite, cinnabar, and quartz veinlets along joint surfaces in Late Cretaceous monzonite and granodiorite stock. Zone of veinlets from 10 to 600 cm thick, traceable for 15 m, zone strikes northwest-southeast. Stock intrudes Lower Cretaceous volcaniclastic rocks of the Gemuk Group. Local trenches and limited underground workings. Sporadic development from 1927 through 1981. Unusual occurrence of Hg-Sb stockwork deposit. SOURCE: Sainsbury and MacKevett, 1965.

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| WC2. 59 44 157 45 | Kemuk Mountain. Fe, Ti, PGE | Zoned mafic-ultramafic. Cretaceous pyroxenite | Estimated 2,200 million tonnes grading 15 to 17% Fe, 2 to 3% $TiO_2$, 0.016% $P_2O_5$ |

DESCRIPTION: Buried titaniferous magnetite deposit hosted crudely zoned pyroxenite. High-angle, high-temperature contact zone with adjacent Permian quartzite and limestone. Pyroxenite interpreted as part of zoned "Alaskan-type" ultramafic pluton. Aeromagnetic survey indicates pluton about 1,500 m thick, and underlying about 6 sq km area. SOURCES: Humble Oil and Refining Company, written commun., 1958; Eberlein and others, 1977; Charles C. Hawley, written commun., 1980.

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| WC3. 60 46 158 46 | Cinnabar Creek. Sb, Hg | Hot-spring Hg. Cretaceous basalt dikes and argillite | Produced about 525 flasks from selected high-grade ore |

DESCRIPTION: Stibnite and cinnabar in shear zones, disseminations, irregular veinlets, and breccias in or near silica-carbonate dikes interpreted as hydrothermally altered basalt dikes. Most sulfides in altered sedimentary rocks. Sulfide bodies generally small. Deposit includes Cinnabar Creek shear zone, Lucky Day, and Landau areas. Ore chutes at Cinnabar exceed 40 m long and 0.5 m wide. Dikes intrude argillite and other clastic rocks of the late Paleozoic to Cretaceous Gemuk Group. SOURCES: Cady and others, 1955; Sainsbury and MacKevett, 1965.

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| WC4.<br>61 07<br>158 15 | Fortyseven Creek.<br>Au, W | Polymetallic vein(?) or Au quartz vein(?).<br>Cretaceous sandstone | Grab samples with up to 17.2 g/t Au. |

DESCRIPTION: Pyrite, arsenopyrite, gold, wolframite, jamesonite, Au-Ag tellurides, and scheelite in numerous, discontinuous quartz veins and pods in mineralized zone about 1.6 km long and 153 to 256 m wide. Veins trend northeast and dip from 50° west to 70° east. Several stockwork zones. Mineralized zone locally sheared and intruded by altered rhyolite dikes. K-Ar age of 57 m.y. for white mica in veins. Subsurface drilling shows zone in lithic sandstone about 300 m wide by 4,000 m long east of Holitna fault. Veins occur in contact metamorphosed siltstone and sandstone of the Kuskokwim Group. SOURCES: Cady and others, 1955; Thomas E. Smith, written commun., 1985.

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| WC5.<br>60 52<br>157 40 | Taylor Mountains.<br>Au, As, Ag, Hg | Epithermal vein(?).<br>Late Cretaceous rhyolite | No data |

DESCRIPTION: Disseminated arsenopyrite, cinnabar, pyrite, and minor gold in Late Cretaceous rhyolite. Area of sulfides at least 200 by 300 m. Sparse sulfide concentrations in quartz-tourmaline veinlets in rhyolite. Sparse massive pyrite along contacts between lithic sandstone and rhyolite. Pyrite, cinnabar, and stibnite in nearby placer deposits in Taylor Creek. SOURCES: Cady and others, 1955; Thomas K. Bundtzen, written commun., 1984.

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| WC6.<br>61 45<br>157 23 | Red Devil.<br>Hg, Sb | Hot-spring Hg.<br>Early Tertiary basalt(?) | Produced 34,745 flasks from 68,000 tonnes through 1963. Produced 4,000 flasks, 1970 to 1972. Average grade of 1.5% Hg and 2% Sb |

DESCRIPTION: Cinnabar and stibnite in about 20 plunging chimney-like bodies located along intersections of two silica-carbonate veins in a wrench fault zone. Ore bodies are crudely prismatic and range from a few centimeters to about 0.2 m in thickness and from 0.1 to 10 m in strike length. Ore bodies plunge along and near intersections between northeast-southwest-trending altered dikes and northwest-southeast-trending faults. Vertical zonation in deposit with pure cinnabar at surface, and increasing stibnite to cinnabar ratios at depth. At 200 m below surface, mainly stibnite and quartz with trace cinnabar. Largest and best exposed of 15 deposits in Kuskokwim mercury belt. Produced about 80 percent of Alaska mercury from 1942 to 1974. Silica-carbonate dikes composed of fine-grained calcite, chalcedony, limonite, and sericite, and subordinate quartz, hematite, and clay minerals. Relict phenocrysts replaced by calcite. Relict diabasic textures in Parks and Willis deposits to northwest. Silica-carbonate veins are interpreted as altered basalt dikes that intrude graywackes and argillite of the Cretaceous Kuskokwim Group. Approximately 3,000 m of underground workings on five levels as of 1963. SOURCES: Herreid, 1962; MacKevett and Berg, 1963; H. R. Beckwith, written commun., 1965; Thomas K. Bundtzen, written commun., 1985.

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| WC7.<br>61 46<br>158 32 | Mission Creek, Owhat (Crooked Creek District).<br>Au, Ag, Cu, As, Sb | Polymetallic vein.<br>Late Cretaceous monzonite | Average of 21 surface samples: 6.4 g/t Au, 53 g/t Ag, 2.5% Cu, 3.0% As, 0.03% Sb, 0.1% Sn, 106 ppm U |

DESCRIPTION: Sheetlike greisen veins with tourmaline, chalcopyrite, arsenopyrite, metazeunerite, scheelite, axinite. Veins occur in zones in cupola of Late Cretaceous porphyritic quartz monzonite stock. Zones up to 20 m wide. About 300 m of drifts. Local numerous euhedral gangue minerals. Nearby similar Cobalt Creek deposit contains 1.2 to 1.5% Sn. SOURCES: Thomas K. Bundtzen and Mark S. Robinson, written commun., 1984.

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| WC8.<br>62 15<br>158 30 | DeCoursey Mountain (Crooked Creek District).<br>Hg, Sb, As | Hot-spring Hg.<br>Late Cretaceous basalt dikes | Produced 1,200 flasks. Grab samples with 6.5% Hg |

DESCRIPTION: Cinnabar, minor stibnite, and traces of arsenopyrite in gangue of quartz, carbonate, and clay minerals. Hosted in silica-carbonate veins in sandstone and shale of Cretaceous Kuskokwim Group, and in olivine basalt dated at 76 m.y. Sulfides occur usually in breccia zones, or along intrusive contact. Discrete sulfide bodies, from 0.2 to 2.0 m thick in zone 600 by 100 m in area with vertical relief of 20 m. Individual sulfide bodies rarely longer than 20 m, with common pinching and swelling. Cinnabar-silica veins apparently associated with basalt dikes. Veins intepreted as altered basalt dikes. SOURCES: Cady and others, 1955; Sainsbury and MacKevett, 1965; Thomas K. Bundtzen, written commun., 1985.

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| WC9.<br>62 13<br>158 15 | Snow Gulch (Crooked Creek District)<br>Sb, Au | Sb-Au vein. Early(?) Tertiary granite porphyry dikes, sills | Surface samples with 30.9 to 61.7 g/t Au, and up to 40% stibnite |

DESCRIPTION: Stibnite blades and crystals, arsenopyrite, and gold in stockworks in brecciated granite porphyry dike, and in veinlets in adjacent sandstone. One surface area, 200 by 40 m, contains at least eight stockwork pods and veins. Local trenches totaling 200 m length. Granite porphyry dikes and sills intrude calcareous sandstone of Cretaceous Kuskokwim Group. SOURCE: Thomas K. Bundtzen, written commun., 1984.

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| WC10.<br>62 30<br>158 00 | Chicken Mountain (Flat District).<br>Au, As, W, Sb, Hg | Polymetallic vein(?).<br>Cretaceous monzonite and gabbro | Stockwork with 7 m of 0.89 g/t Au; altered monzonite with 0.6 g/t Au |

DESCRIPTION: Veinlets with arsenopyrite, scheelite, cinnabar, gold, and stibnite. Hosted in intensely altered southern part of the Chicken pluton (monzonite and gabbro). Pervasive sericite alteration and bleaching in area 250 by 600 m, with veinlet and fractures densities of 2 to 10 per square meter. Plutonic-hosted stockwork Au-Ag deposit. Chicken pluton intrudes sedimentary rocks of Cretaceous Kuskokwim Group. SOURCES: Gaylord Cleaveland, written commun., 1979; Jason Bressler, written commun., 1980; Bundtzen and Gilbert, 1983; Bundtzen and Laird, 1983a, c; Bundtzen and others, 1985.

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| WC11.<br>62 31<br>157 55 | Golden Horn, Malemute, Granite (Flat District).<br>Au, Ag, Sb, Hg, W | Polymetallic vein or Sb-Au vein. Cretaceous monzonite or altered basalt | Golden Horn: produced 479 tonnes grading 174 g/t Au, 171 g/t Ag, up to 20% $WO_3$. Zones with 1 m of 50% stibnite, 60 m of 0.82 g/t Au. Malemute and Granite, 69 g/t Au |

DESCRIPTION: Golden Horn: Veins of stibnite, cinnabar, scheelite, sphalerite, Pb-Sb sulfosalts, and chalcopyrite in gangue of quartz, tourmaline, and calcite. Stibnite and cinnabar crosscut other sulfides. Veins occur in irregularly distributed quartz-filled shear zones in the Otter Creek pluton (monzonite), or near intrusive contacts. Vein system from 3 to 30 m wide for at least 1 km length; occurs along 3-km-long fault zone on eastern side of pluton. Pluton intrudes clastic rocks of Cretaceous Kuskokwim Group. Malemute and Granite: Cinnabar, arsenopyrite, pyrite, and gold in quartz-calcite zones. Zones strike north-south to northeast; hosted in altered basalt west of Otter Creek pluton. SOURCES: Bundtzen and Gilbert, 1983; Bundtzen and Laird, 1983a; Bundtzen and others, 1985.

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| WC12.<br>62 37<br>157 10 | Broken Shovel.<br>(Flat District)<br>Ag, Pb, Sb | Polymetallic vein.<br>Cretaceous monzonite(?) | Estimated 14,000 tonnes with 178 g/t Ag, 0.15% Pb, 0.15% Sb. Zone 60 m long with 175 g/t Ag |

DESCRIPTION: Tourmaline, quartz, tetrahedrite, arsenopyrite, and undetermined sulfosalts in veins hosted in central part of the Cretaceous Moose Creek pluton (monzonite). Veins from 1 to 3 m wide; occur in sericite and tourmaline altered area about 300 by 400 m. SOURCES: Bundtzen and Gilbert, 1983; Bundtzen and Laird, 1983a, c; Bundtzen and others, 1985.

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| WC13.<br>62 53<br>156 59 | Cirque, Tolstoi<br>(Innoko District).<br>Cu, Ag, Sn, W | Polymetallic vein and porphyry Cu. Cretaceous monzonite stock | Grab samples with up to 20% Cu, 1,340 g/t Ag, 0.5% Sn; locally to to 0.1% Nb |

DESCRIPTION: Chalcopyrite, tetrahedrite, pyrite, arsenopyrite, and scheelite in gangue of tourmaline, axinite, and quartz occurring in structurally high-level tourmaline greisen. Greisen usually along faults, or in tourmaline breccia pipes. Faults and pipes in cupolas of the Late Cretaceous Beaver Mountains (monzonite) stock. Monzonite capped by altered olivine basalt. SOURCE: Bundtzen and Laird, 1982.

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| WC14.<br>62 57<br>156 59 | Independence<br>(Innoko District).<br>Au | Polymetallic vein.<br>Cretaceous dacite to rhyolite dike | Produced 1,770 g gold from 113 tonnes ore grading 16 g/t Au |

DESCRIPTION: Quartz-fissure fillings with gold, pyrite, and arsenopyrite in altered dacite to rhyolite dike. Dike occurs in 60-km-long by 3-km-wide Yankee Creek dike swarms that intrude clastic rocks of the Cretaceous Kuskokwim Group. Several hundred meters of underground workings. SOURCE: Bundtzen and Laird, 1983a.

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| WC15.<br>62 51<br>155 48 | Candle.<br>(Innoko District)<br>Cu, Pb, Ag | Polymetallic vein.<br>Cretaceous monzonite and basalt | Grab samples averaging 280 g/t Cu, 185 g/t Pb, 6.8 g/t Ag |

DESCRIPTION: Cinnabar, arsenopyrite, and quartz in stockworks in sericite-altered monzonite near intrusive contact with overlying altered olivine basalt. Local quartz-chalcopyrite disseminations in a Late Cretaceous monzonite and basalt complex. Central part of basalt field contains 300 by 500 m zone of disseminated sulfides. SOURCES: Bundtzen and Laird, 1982; Thomas K. Bundtzen, written commun., 1984.

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| WC16.<br>63 13<br>156 04 | Win-Won or Cloudy Mountain (Innoko district).<br>Sn, Ag, Cu | Sn polymetallic vein.<br>Cretaceous(?) monzonite | Grab samples with up to 2% Sn and 1,720 g/t Ag |

DESCRIPTION: Chalcopyrite, tetrahedrite, and cassiterite in en-echelon quartz stockwork. Hosted in hornfels on northeast margin of Cloudy Mountains volcanic field and related plutonic complex. About 4 veinlets per meter over a 100-m-wide area. SOURCE: Thomas K. Bundtzen, written commun., 1984.

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| WC17.<br>62 10<br>154 51 | White Mountain.<br>Hg | Hot-spring Hg(?).<br>Middle Paleozoic dolomite, limestone, shale | Chip samples grading 5 to 30% cinnabar. Produced about 3,500 flasks |

DESCRIPTION: Cinnabar in fault zones between Ordovician limestone and shale. Zones in belt about 1 km wide and 3 km long on northwest side of Farewell fault. In south zone, cinnabar occurs as small crystalline coatings in brecciated dolomite, as coatings on breccia surfaces, and as irregular veinlets. In central zone, cinnabar zones more irregular and occur in silicified limestone and dolomite. In north zone, rich cinnabar lodes occur on both sides of major fault between middle Paleozoic shale and limestone. One area in north zone with massive cinnabar up to 350 m long and 10 to 15 cm thick. Local cinnabar zones

in dolomitized limestone with small karst-like caverns. Gangue minerals of dolomite, chalcedony, calcite, dickite, and limonite. Main production from 1964 to 1974. SOURCES: Sainsbury and MacKevett, 1965; Brian K. Jones, written commun., 1984; Thomas K. Bundtzen, written commun., 1984.

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| WC18.<br>63 14<br>154 47 | Nixon Fork-Medfra (Nixon Fork District).<br>Au, Cu, Ag, Bi, Sn, W, Th | Cu-Au skarn. Paleozoic limestone intruded by Late Cretaceous monzonite pluton | Produced about 1.24 to 1.87 million g Au, and undisclosed Cu, Ag. Individual deposits with up to 113 g/t Au, 1.5 to 2% Cu |

DESCRIPTION: Chalcopyrite, pyrite, bornite, and native bismuth in skarns occurring as irregular replacement bodies in recrystallized Ordovician limestone of the Telsitna Formation. Gangue minerals of diopside, garnet, plagioclase, epidote, and apatite. Oxidized actinolite skarn with limonite, quartz, malachite, pyrite, and gold. Skarns mainly in fractures; up to 1 to 4 m wide, up to 50 m long, and usually within 40 m of intrusive contact with Late Cretaceous monzonite. A few skarns in roof pendants overlying pluton. Pluton about 10 square km, and occurs near Nixon-Iditarod fault. Additional smaller skarn veinlets in fault controlled areas away from main skarn bodies. Local extensive sericitic alteration. Most of ore from zone of secondary enrichment that formed during alteration of primary skarn by groundwater. Lower grade sulfide-rich ore at depths greater than 60 m. About 1,300 m of workings extending to 170 m depth. District includes Crystal, Garnet, High Grade, Main, Mespelt, Recreation, and Whalen deposits. SOURCES: Martin, 1921; Brown, 1926; Jasper, 1961; Herreid, 1966; Bundtzen and Gilbert, 1983b.

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| WC19.<br>63 29<br>154 10 | Reef Ridge.<br>Zn, Pb | (Carbonate-hosted sulfide). Silurian and Devonian carbonate rocks | Grab samples with up to 20% Zn, 5% Pb, minor Ag. Estimated 181,400 tonnes of 15% combined Zn, Pb |

DESCRIPTION: Stringers of brown sphalerite and minor galena in hydrothermal breccia in carbonate rocks of the Silurian and Devonian Whirlwind Creek Formation. Minimum strike length of 2,000 m and up to 15 m thick. Sulfides pinch and swell along strike. Best known of ten similar nearby occurrences. Deposit similar to Mississippi Valley Pb-Zn deposit of Cox and Singer (1986). SOURCE: Harold Noyes, written commun., 1984.

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| WC20.<br>63 40<br>154 04 | Medfra (Nixon Fork District).<br>Fe, Cu, Zn | Fe skarn. Lower Paleozoic limestone intruded by Cretaceous granite | Estimated 12,000 cubic meters grading 85% $Fe_2O_3$ with traces of Cu, Au |

DESCRIPTION: Magnetite, very minor chalcopyrite and sphalerite in epidote and garnet skarn. Irregular elliptical shape to skarn body. Hosted in Ordovician dolomitized limestone of the Telsitna Formation adjacent to Late Cretaceous granite stock. Computer modeling of magnetic survey suggests 40,000 to 50,000 tonnes of magnetite. SOURCES: Patton and others, 1980, 1984.

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| WC21.<br>63 58<br>153 17 | Sischu Creek.<br>U, Th | Felsic plutonic U. Late Cretaceous and early Tertiary volcanic and plutonic rocks | Grab samples with 0.002 to 0.007% U and 0.011 to 0.013% Th |

DESCRIPTION: Strongly radioactive U- and Th-rich porphyritic sanidine rhyolite and quartz porphyry flows in two belts, each about 1.5 to 3 km wide, 6 km long. Rhyolite flows exhibit 400 to 600 cps on hand-held scintillometer. Associated mafic and intermediate volcanic piles, volcanic-plutonic complexes, silicic dikes, sills, domes, and flows, and numerous granitic stocks and plugs with K-Ar ages of 60 to 70 m.y. SOURCES: Miller and others, 1980; Patton and Moll, 1980.

## PODIFORM CHROMITE DEPOSITS IN DEFORMED ULTRAMAFIC ROCKS IN THRUST SLICES, TOZITNA AND INNOKO AREAS, NORTHEASTERN KUSKOKWIM MOUNTAINS

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| WC22.<br>63 14<br>156 55 | Mount Hurst.<br>Cr, PGE | Podiform chromite.<br>Jurassic(?) serpentinized dunite | Grab samples with 22.0 to 61.2% $Cr_2O_3$ |

DESCRIPTION: Coalescent or banded chromian spinel in dunite layers in wehrlite tectonite. Largest of 16 chromite bands strikes north-south; pinches and swells from 10 to 800 cm over strike length of 10 m. Within bands, chromian spinel varies from 30% to 80% by volume. Deposit truncated on north by fault. Cr:Fe ratios for six samples average 1.0. Probable source of Pt placer on Boob Creek 10 km to north. Dunite and wehrlite tectonite faulted at base; interpreted as part of intensely deformed and dismembered ophiolite occurring in klippe. SOURCES: Chapman and others, 1982; Loney and Himmelberg, 1984; Roberts, 1984.

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| WC23.<br>64 10<br>156 40 | Kaiyuh Hills (Yuki River).<br>Cr | Podiform chromite.<br>Jurassic(?) serpentinized dunite and harzburgite tectonite | Estimated 15,000 to 34,000 tonnes $Cr_2O_3$ in one deposit. Largest deposit averages 60% $Cr_2O_3$ on surface |

DESCRIPTION: Bands and disseminations of chromite ranging from 1 cm to 1 m thick. Hosted in fresh and serpentinized dunite of Kaiyuh Hills ultramafic belt. Dunite interlayered with harzburgite tectonite. Largest deposit, 1 m by 100 m, consists of massive chromite with estimated 5,000 tonnes $Cr_2O_3$. Lesser occurrences of banded nodular pods of chromite. Metallurgical grade chromite present with 46% $Cr_2O_3$. Dunite and harzburgite tectonite faulted at base; interpreted as part of complexly deformed and dismembered ophiolite, part of Rampart ophiolite belt. SOURCES: Loney and Himmelberg, 1984; Foley and others, 1984.

## POLYMETALLIC AND EPITHERMAL VEIN, PORPHYRY Mo, AND PORPHYRY Cu DEPOSITS, WEST-CENTRAL YUKON-KOYUKUK BASIN

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| WC24.<br>63 16<br>159 16 | McLeod.<br>Mo | Porphyry Mo.<br>Late Cretaceous to early Tertiary granite porphyry | Extensive chip samples grade 0.09% $MoS_2$ over a 350 by 30 m surface area |

DESCRIPTION: Platy aggregates of molybdenite in quartz veinlets in sericite-rich core of altered quartz-feldspar (granite) porphyry stock. High-grade quartz-molybdenite fissure veins up to 15 cm thick associated with nearby latite dikes in sedimentary host rocks. Pyrite-pyrrhotite-chlorite veinlets, up to 10 percent by volume, in contact metamorphosed country rock. Quartz-feldspar porphyry, and to lesser extent, biotite latite dikes exhibit intense silicic, phyllic, and hydrothermal alteration in a 300 by 1,100 m area of southern and western part of stock. Low-grade stockwork molybdenite occurs in northern part of biotite latite dike system over a 30 by 350 m area. Area of deposit underlain by 3-square-kilometer granite stock and associated biotite latite dikes intruding mid-Cretaceous graywackes. SOURCES: Mertie, 1937a, b; West, 1954; Jason Bressler, written commun., 1979; Harold Noyes, written commun., 1984.

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| WC25.<br>64 05<br>158 00 | Illinois Creek.<br>Cu, Ag, Au, Pb, Zn | Polymetallic vein and porphyry Cu. Cretaceous porphyritic granitic plutons | No data |

DESCRIPTION: High-grade galena-sphalerite veins near contact between altered granite porphyry, and massive, pipe-like gossan in marble. Abundant sericite alteration in nearby granitic plutons which contain stockwork veinlets with chalcopyrite, galena, and detectable precious metals. Local chalcocite supergene(?) enrichment may possibly overlie

a buried porphyry Cu deposit. Other areas with epigenetic replacement, veins, and skarn with base-metal sulfides. Area is poorly exposed. Cretaceous plutonic rocks intrude early Paleozoic and older greenschist, quartzite, and orthogneiss. SOURCES: Thomas K. Bundtzen, written commun., 1984; William W. Patton, Jr., written commun., 1985.

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| WC26.<br>64 45<br>157 30 | Perseverance.<br>Pb, Ag, Sb | Polymetallic vein(?).<br>Paleozoic(?) mica schist | Average ore grade of 73% Pb, and 124 g/t Ag. Produced 231 tonnes ore |

DESCRIPTION: Coarse-grained galena, tetrahedrite, and traces of fibrous jamesonite in veins crosscutting bedding and schistosity in Paleozoic(?) chlorite-mica schist. Gangue of dolomite and minor quartz. Vein strikes northeast-southwest and dips south. Oxidized zones in vein contain cerussite, azurite, malachite, and stibiconite(?). Mined from 1920 to 1927, and 1981. Age of deposit unknown. SOURCE: Brian K. Jones, written commun., 1984.

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| WC27.<br>64 45<br>155 30 | Beaver Creek.<br>Ag, Pb, Zn | Polymetallic vein.<br>Paleozoic(?) mica schist, marble, and quartzite | Estimated 14,000 tonnes grading 103 g/t Ag, 0.8% Zn, 0.5% Cu; additional 19,000 tonnes grading 26.1 g/t Ag, 4.2% Pb, 0.16% Zn, 0.2% Cu |

DESCRIPTION: Highly oxidized zones of limonite, goethite, argentiferous galena, quartz, and sphalerite. Surface occurrences of massive galena and limonite-cerussite gossan. Eastern and western zones occur for 300 m along strike, range from 2.5 to 5 m thick. Zone separated by fractured schist and marble. Hosted in early Paleozoic(?) muscovite schist trending northeast-southwest and dipping steeply northwest. Deposition of sulfides controlled by structures in metamorphic host rocks. Age of deposit unknown. SOURCES: Brown, 1926; Thomas, 1963; Brian K. Jones, written commun., 1984.

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| WC28.<br>65 30<br>161 26 | Quartz Creek<br>Pb, Zn, As, Ag | Polymetallic vein.<br>Jurassic or Cretaceous andesite and granite | Up to 15% combined Pb and Zn, and 340 g/t Ag |

DESCRIPTION: Disseminated sulfides occurring in zone 3.2 to 8 km wide and over 29 km long in altered andesite and granite of Jurassic or Cretaceous age. Mainly argentiferous galena, sphalerite, pyrite, and arsenopyrite. Local realgar, orpiment, and tourmaline also present. SOURCES: Miller and Elliott, 1969; Bundtzen and others, 1984b.

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## FELSIC PLUTONIC U DEPOSITS, PURCELL DISTRICT, NORTHERN YUKON-KOYUKUK BASIN

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| WC29.<br>66 16<br>157 20 | Wheeler Creek.<br>(Purcell District).<br>U | Felsic plutonic U.<br>Cretaceous alaskite | Grab samples with up to 0.0125% U |

DESCRIPTION: Uranothorianite and gummite in small, altered, smoky quartz-rich veinlets, and in altered areas in Late Cretaceous alaskite. Deposit about 500 m long and 50 m wide. SOURCES: Eakins and Forbes, 1976; Miller, 1976; Jones, 1977.

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| WC30.<br>66 16<br>155 50 | Clear Creek<br>(Purcell District).<br>U | Felsic plutonic U. Late Cretaceous syenite and bostonite dikes | Grab samples with up to 0.04% U, and 0.055% Th |

DESCRIPTION: Uraniferous nepheline syenite and bostonite dikes in Late Cretaceous andesite. Dikes within contact aureole of Late Cretaceous monzonite to granodiorite pluton of Zane Hills. SOURCES: Eakin and Forbes, 1976; Miller, 1976; Jones, 1977.

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| WC31.<br>66 10<br>155 55 | Zane Hills (Purcell District).<br>U, Th | Felsic plutonic U. Cretaceous monzonite to granodiorite | Grab samples with up to 0.027% Th |

DESCRIPTION: Uranothorianite, betafite, uraninite, thorite, and allanite in veinlets in foliated monzonite border phase of the Late Cretaceous Zane Hills pluton. Border phase grades to syenite. Biotite-hornblende granodiorite in core of pluton. SOURCES: Eakin and Forbes, 1976; Miller, 1976; Jones, 1977; Miller and Elliott, 1977.

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SERPENTINE-HOSTED ASBESTOS AND PODIFORM CHROMITE DEPOSITS, NORTHERN AND EASTERN YUKON-KOYUKUK BASIN

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| WC32.<br>67 01<br>156 50 | Asbestos Mountain.<br>Asbestos, jade, talc | Serpentine-hosted asbestos. Jurassic or older ultramafic rocks | No data |

DESCRIPTION: Serpentinite with veins of cross- and slip-fiber tremolite and chrysotile. Small deposits of talc, soapstone, and nephrite. About 35 tonnes tremolite mined in 1940 to 1945. Probably source of nephrite jade boulders in Dahl Creek. Part of dismembered ophiolite exposed discontinuously in klippe in the Jade Mountains-Cosmos Hills area, along the northern flank of Yukon-Koyukuk basin. SOURCES: Coats, 1944; Heide and others, 1949; Roeder and Mull, 1978; Loney and Himmelberg, 1985b.

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| WC33.<br>66 05<br>150 55 | Caribou Mountain, Lower Kanuti River, Holonada.<br>Cr | Podiform chromite. Jurassic or older dunite and peridotite tectonite | Estimated 2,300 tonnes $Cr_2O_3$ at Caribou Mountain, 730 tonnes at Lower Kanuti River, up to 25,000 tonnes at Holonada |

DESCRIPTION: Elongate belt of podiform chromite deposits, over 100 km long. Larger deposits at Caribou Mountain, lower Kanuti River, and Holonada. Caribou Mountain: ten chromite occurrences with three containing bands of massive and coalescent chromite, and magnesian chromohercynite in layers up to 3 m thick and 20 m long. Lower Kanuti River: one layer of high-chromium chromite, about 1.5 m wide and at least 25 m long containing 7.5% $Cr_2O_3$. Holonada: ten occurrences of bands of disseminated to massive chromite several meters thick and long. One occurrence 1.5 to 3 m thick with exposed strike length of 130 m, with average grade of 20% $Cr_2O_3$. Four other occurrences with about 1,000 tonnes averaging 4% to 8% $Cr_2O_3$. Deposits at all three areas interpreted as part of complexly deformed and disrupted ophiolite, part of Yukon-Koyukuk ophiolite belt. SOURCES: Patton and others, 1977; Foley and McDermott, 1983; Foley and others, 1985; Loney and Himmelberg, 1985a.

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POLYMETALLIC OR EPITHERMAL VEIN, AND W SKARN DEPOSITS, EASTERN YUKON-KOYUKUK BASIN

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| WC34.<br>66 30<br>150 10 | Upper Kanuti River.<br>Pb, Zn, Ag | Polymetallic or epithermal vein. Early Tertiary rhyolite porphyry | Grab samples with up to 2% Pb, 0.3% Zn, and 30 g/t Ag |

DESCRIPTION: Disseminated pyrite, galena, and sphalerite occur as grains up to 5 mm long in extensive altered gossan zone about 100 m long in silicified rhyolite, locally brecciated. Rhyolite sits on and probably intrudes the Cretaceous pluton of the Kanuti batholith. SOURCE: Patton and Miller, 1970.

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| WC35.<br>66 37<br>150 01 | Bonanza Creek.<br>W, Ag, Cu | W skarn. Early Paleozoic or older pelitic schist and marble | Grab samples with up to 0.89% W, 300 g/t Ag, 0.65% Cu |

DESCRIPTION: Scheelite, chalcopyrite, and pyrrhotite in skarn adjacent to intrusive contact with biotite granite pluton. Scheelite occurs mainly as sparse disseminated grains, along with very sparse sulfides in garnet-pyroxene skarn and on fracture surfaces in calc-silicate schist. Local limonite staining. Local quartz-scheelite veins in calc-silicate schist, and quartz-molybdenite veins in biotite granite. Granite pluton part of the Kanuti batholith with K-Ar age of 90.6 m.y. Other wallrocks include early Paleozoic or older pelitic schist, quartz-mica schist, quartz-feldspar schist, quartzite, and calcareous quartz-mica schist. Marble layer, about 15 m thick, interlayered with pelitic schist. Local trenches. SOURCE: Clautice, 1980.

## SIGNIFICANT METALLIFEROUS LODE DEPOSITS, EAST-CENTRAL ALASKA

By Thomas E. Smith, Mark S. Robinson, and Warren J. Nokleberg, with contributions from Thomas K. Bundtzen, P. Jeffery Burton, Robert M. Chapman, Edward R. Chipp, Helen L. Foster, Curtis J. Freeman, David R. Gaard, Wyatt G. Gilbert, Ian M. Lange, W. David Menzie, Paul A. Metz, Clint R. Nauman, Steven R. Newkirk, and Robert K. Rogers

| MAP NUMBER. LATITUDE LONGITUDE | NAME. COMMODITIES | TYPE. GEOLOGIC HOST UNIT | TONNAGE AND GRADE. PRODUCTION, IF KNOWN |
|---|---|---|---|

### POLYMETALLIC, Au QUARTZ, Sb-Au, Mn-Ag, Hg QUARTZ VEIN, FELSIC PLUTONIC U, AND Sn GREISEN AND VEIN DEPOSITS, MANLEY AND LIVENGOOD REGION, NORTHWESTERN YUKON-TANANA UPLAND

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|---|---|---|---|
| EC1.<br>65 02<br>150 45 | Hot Springs Dome.<br>Pb, Ag, Zn, Au, Cu | Polymetallic vein.<br>Jurassic and Cretaceous metasedimentary rocks | Grab samples with about 5.8 g/t Au, up to 274 g/t Ag, 3.7% Pb, 0.32% Zn |

DESCRIPTION: Six east-west-striking veins, possibly in shear zones, in contact-metamorphosed argillite, graywacke, conglomerate, and minor conglomerate, part of Jurassic and Cretaceous flysch. Veins at surface contain galena coated with anglesite and limonite pockets. At depth, veins also contain siderite, copper carbonates, chalcopyrite, pyrrhotite, pyrite, and erythrite. Zone up to 600 m long and 9 m wide. Numerous quartz veinlets. Deposit at contact with early Tertiary biotite granite. Three shallow shafts. SOURCE: Maloney, 1971.

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| EC2.<br>65 16<br>150 25 | Avnet (Buzby).<br>Mn, Ag | (Mn-Ag vein).<br>Lower and middle Paleozoic chert, quartzite | Grab samples with 0.6 to 34% Mn and up to 9.6 g/t Ag |

DESCRIPTION: Irregular masses of psilomelane up to 7.6 cm long in latticework of thin seams of vein quartz, and as thin surface coating on fractured lower and middle Paleozoic chert, quartzite, limestone, dolomite, and greenstone. One trench and two pits. SOURCE: Thomas, 1965.

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| EC3.<br>65 23<br>149 30 | Sawtooth Mountain.<br>Sb, Au, Ag | Sb-Au vein.<br>Jurassic or Cretaceous clastic sedimentary rocks | Grab samples from dump with up to 46.2% Sb, 0.7 g/t Au, 15.1 g/t Ag. Produced about 590 tonnes with 58% $Sb_2S_3$ through 1970 |

DESCRIPTION: Massive stibnite in a vertical cylinder about 3 m wide. Hosted in argillite of Jurassic or Cretaceous flysch near contact with Cretaceous granite with K-Ar age of 88.3 m.y. One shaft about 30 m deep. Minor production in 1984 and 1985. SOURCE: R. M. Chapman, written commun., 1985.

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| EC4.<br>65 31<br>148 30 | Gertrude Creek, Griffen, Ruth Creek.<br>Au, Ag, Pb, Sb | Sb-Au vein. Middle Paleozoic greenstone, slate, calc-schist, and Cretaceous monzonite | Grab samples with up to 15% Sb, 3.9 g/t Au, 0.1% Ni |

DESCRIPTION: Quartz stringers up to 8 cm wide with pyrite, arsenopyrite, stibnite, and gold in altered diorite and dolomite-calcite-quartz silica-carbonate rock. Stringers also in shear zone adjacent to serpentinite. Short adit and a few pits scattered across Amy Dome area. SOURCES: Foster, 1968a, b; Allegro, 1984a.

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| EC5.<br>65 30<br>148 22 | Hudson Cinnabar.<br>Hg | (Hg quartz vein).<br>Late Cretaceous to early Tertiary granite | No data |

DESCRIPTION: Cinnabar in disseminations and quartz veins in altered granite dikes and plutons intruding Ordovician to Devonian siltstone and argillite. SOURCE: Robinson and others, 1982.

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| EC6.<br>65 29<br>147 05 | Roy Creek (former Mount Prindle)<br>U, Th | Felsic plutonic U.<br>Cretaceous alkalic granitic rocks | Drill core with up to 5 to 10% REE by volume |

DESCRIPTION: Fissure veins with allanite, bastnaesite, monazite, thorianite, thorite, uraninite, and xenotime in Cretaceous porphyrytic biotite syenite and alkali granite. Deposit contains significant La, Ce, Nd, Pr, Yt, and fluorite. Hematitic alteration of wall rocks and leaching of magnetite in host rocks. Deposit and granitic rocks occur about 25 km west of Mount Prindle and intrude Cambrian(?) sandstone, quartzite, argillite, and chert. SOURCE: Burton, 1981.

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| EC7.<br>65 37<br>146 43 | Lime Peak.<br>Sn, Ag, Zn, U<br>W | Sn greisen and Sn vein.<br>Early Tertiary granite | Grab samples with up to 0.16% Sn, 0.5% Cu, 0.2% Pb, 1.8% Zn, 14 g/t Ag |

DESCRIPTION: Areas of veinlets, breccia zones, and pods of black tourmaline, and areas of chlorite, sericite, green tourmaline, and quartz alteration in early Tertiary hypabyssal, peraluminous, biotite granite pluton. Granite pluton cut by numerous felsic and minor intermediate dikes. Veins up to 0.5 m wide. Areas of veinlets, breccia zones, and tourmaline pods interpreted as deuteric alteration; areas of chlorite, sericite, and quartz interpreted as hydrothermal alteration. Anomalous high values of Sn and associated pathfinder elements (Ag, B, Bi, Mo, Pb, Zn) found in rock samples from and around pluton. Rare fluorite, topaz, pyrite, chalcopyrite, and molybdenite in altered areas. Placer cassiterite in surrounding area. Two main phases to pluton: older coarse-grained equigranular biotite granite; younger porphyritic biotite granite with fine-grained groundmass. Local miarolitic cavities in pluton. K-Ar age of 56.7 m.y. for granite which intrudes Cambrian(?) sandstone, shale, slate. SOURCES: Menzie and others, 1983; Burton and others, 1985; W. David Menzie, written commun., 1985.

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## Au QUARTZ, Sb-Au, AND Au-As VEIN, W SKARN, AND Sn-GREISEN DEPOSITS, NORTHERN AND CENTRAL YUKON-TANANA UPLAND

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| EC8.<br>65 21<br>146 33 | Dempsey Pup.<br>Sb, Au(?) | Sb-Au vein.<br>Middle Paleozoic or older metasedimentary rocks | Grab samples with up to 28% Sb. Produced a few hundred tonnes of low-grade ore |

DESCRIPTION: Quartz vein with small lenses and stringers of stibnite and possibly gold. Hosted in middle Paleozoic or older quartz schist, mica schist, and marble of Yukon Crystalline terrane. Several short tunnels. SOURCE: Killeen and Mertie, 1951.

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| EC9.<br>65 29<br>145 53 | Table Mountain.<br>Au, Sn, Be, W | Au quartz vein(?).<br>Early Tertiary granite pluton, dikes, and adjacent schist | Grab samples with up to 140 g/t Au, 0.007% Sn, 0.15% Be |

DESCRIPTION: Pyrrhotite, arsenopyrite, minor chalcopyrite, rare enargite and sphalerite, and high Au values in black biotite schist and in quartz veins adjacent to fault zone intruded by a hypabyssal felsic dike. About 5 km northeast, low Au values in country rocks adjacent to granite pluton, felsic dikes in granite, and in felsic dikes. Granite pluton crops out over 2 sq km area. Granite and adjacent biotite schist with high Be values. Small skarns with high W values. Similar nearby plutons exhibit early Tertiary K-Ar ages.

SOURCES: Burack, 1983; Foster and others, 1983; W. David Menzie, written commun., 1985.

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| EC10.<br>65 27<br>144 50 | Bedrock Creek.<br>Cu, W, Th | Porphyry Cu(?).<br>Early Tertiary granitic pluton | No data |

DESCRIPTION: Disseminated monazite and minor scheelite, pyrrhotite, garnet, ilmenite, zircon, biotite, topaz, and malachite. Hosted in early Tertiary granite of the Circle pluton with K-Ar age of 60.5 m.y. Pluton intrudes middle Paleozoic or older schist of Yukon Crystalline terrane. SOURCE: Nelson and others, 1954.

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| EC11.<br>65 33<br>145 15 | Miller House.<br>Au | (Au-As vein).<br>Middle Paleozoic or older metasedimentary rocks | Grab samples with up to 3.9 g/t Au |

DESCRIPTION: Massive to disseminated arsenopyrite in four large and four small iron-stained shear zones. Zones over 150 m long occur in middle Paleozoic or older schist of Yukon Crystalline terrane. Intense alteration along zones. Early Tertiary age interpreted for deposit. SOURCES: Tripp and others, 1980; Menzie and others, 1983.

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| EC12.<br>65 29<br>144 41 | Ketchem Dome.<br>Sn | Sn greisen.<br>Early Tertiary granitic pluton | Grab samples with up to 0.51% Sn |

DESCRIPTION: Greisen zones, up to 4 cm wide, and quartz veins. Hosted in intensely chlorite-altered breccia along northern margin of the composite early Tertiary Circle (granite) pluton with K-Ar age of 60.5 m.y. Pluton intrudes middle Paleozoic or older schist of the Yukon Crystalline terrane. Limited exploration in 1978 and 1981. SOURCES: Foster and others, 1983; Menzie and others, 1983; W. David Menzie, written commun., 1984.

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| EC13.<br>65 07<br>144 38 | Salcha River.<br>W | W skarn.<br>Middle Paleozoic or older marble | No data |

DESCRIPTION: Scheelite in discontinuous idocrase-garnet skarn in layered calc-silicate schist and impure marble along contact with early Tertiary granite pluton. Schist and marble part of middle Paleozoic or older Yukon Crystalline terrane. SOURCES: Foster and others, 1983; Menzie and others, 1983; W. David Menzie, written commun., 1984.

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## Sb-Au, Au QUARTZ, AND POLYMETALLIC VEIN, AND W SKARN DEPOSITS, FAIRBANKS DISTRICT, NORTHERN YUKON-TANANA UPLAND

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| EC14.<br>65 00<br>147 49 | Scrafford.<br>Sb, Au | Sb-Au vein.<br>Middle Paleozoic or older metasedimentary and metavolcanic rocks | Average grade of about 36% Sb. Footwall chip samples with 1.4 to 5.7 g/t Au. Produced 906,000 kg Sb from 2,500 tonnes ore |

DESCRIPTION: Massive stibnite along east-west-striking shear zone. Disseminated quartz stockwork and veinlets with arsenopyrite and stibnite in feldspathic quartzite and quartz mica schist in shear footwall. Barren pelitic schist and quartzite in hanging wall. Host rocks part of the upper Precambrian(?) Cleary sequence, part of the middle Paleozoic or older Yukon Crystalline terrane. SOURCES: Chapin, 1914, 1919; Robinson and Bundtzen, 1982; Thomas E. Smith and Paul A. Metz, written commun., 1984.

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| EC15.<br>65 04<br>147 25 | Cleary Summit (Fairbanks District).<br>Au, Ag | Polymetallic vein(?).<br>Middle Paleozoic or older metasedimentary rocks | Estimated 145,000 tonnes production grading 10 to 55 g/t Au |

DESCRIPTION: Quartz fissure veins from a few centimeters to a few meters thick with gold, boulangerite, jamesonite, tetrahedrite, galena, stibnite, scheelite, pyrite, and arsenopyrite. Most productive veins strike northwest-southeast and dip variably to south. District includes 78 known lode occurrences, 30 with production. Veins in interlayered mica quartzite, graphitic schist, pelitic schist, chlorite-actinolite greenschist, calc-schist, and marble of the upper Precambrian(?) Cleary sequence, part of the middle Paleozoic or older Yukon Crystalline terrane. SOURCES: Chapman and Foster, 1969; Smith and others, 1981; Thomas E. Smith and Paul A. Metz, written commun., 1984.

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| EC16.<br>64 59<br>147 21 | Gilmore Dome Area (Fairbanks District).<br>W, Au | W skarn.<br>Middle Paleozoic or older metasedimentary and metavolcanic rocks | Estimated 20,000 tonnes grading 0.5 to 3.6% $WO_3$.<br>Produced about 4,000 units $WO_3$. |

DESCRIPTION: Scheelite skarn in layers, or locally in zoned veins crosscutting layers. Major skarn types are scheelite-amphibole-quartz-calcite, pyroxene-garnet-scheelite, and quartz-amphibole-calcite-scheelite skarn. District includes 15 known lode tungsten prospects, four with significant production. Hosted in calc-schist and marble of the Cleary sequence with interlayered amphibolite, all part of the middle Paleozoic or older Yukon Crystalline terrane. Skarns form discontinuous bodies near, and at contact with the Gilmore Dome (granite) pluton of Late Cretaceous age. Includes Spruce Hen, Yellow Pup, and Stepovitch mines. Production between 1916-1919, 1941-1945, and 1951-1955. SOURCES: Byers, 1957; Robinson, 1981; Allegro, 1984b; Thomas E. Smith and Paul A. Metz, written commun., 1984.

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| EC17.<br>64 52<br>148 05 | Ester Dome (Fairbanks District)<br>Au, Ag | Polymetallic vein(?).<br>Middle Paleozoic or older metasedimentary and metavolcanic rocks | Produced about 90,700 tonnes grading 6.8 to 78.9 g/t Au |

DESCRIPTION: Quartz fissure veins from a few centimeters to 5.5 m thick and up to 1,200 m long with gold, pyrite, arsenopyrite, and stibnite, and minor jamesonite, argentite, chalcocite, and covellite. Area includes 58 known lode occurrences, 27 with production. Steeply dipping quartz veins up to a few meters thick most common; local sheared veins up to 22 m thick. Multiple episodes of quartz deposition. Veins occur in micaceous quartzite, graphitic schist, calc-schist, and marble of middle Paleozoic or older Yukon Crystalline terrane. About 26 producing vein deposits in area. Grant deposit has estimated 910,000 tonnes grading 6.9 to 27 g/t Au. Ryan Lode deposit has estimated 9.1 million tonnes ranging from 2.0 to 15.0 g/t Au. SOURCES: Hill, 1933; Thomas, 1973; Thomas E. Smith and Paul A. Metz, written commun., 1984.

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| EC18.<br>64 20<br>146 22 | Democrat (Fairbanks District).<br>Au | Au quartz vein.<br>Tertiary rhyolite porphyry | No data |

DESCRIPTION: Stockwork of quartz-sulfide veins with disseminated gold in Tertiary rhyolite porphyry. Gold commonly associated with galena and tetrahedrite. Moderate production from 1918 to 1922. SOURCES: Bundtzen and Reger, 1977; Menzie and Foster, 1978.

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|---|---|---|---|
| EC19.<br>64 20<br>144 14 | Blue Lead, Tibbs Creek, Gray Lead.<br>Au, Ag, Sb | Polymetallic vein or Sb-Au vein. Cretaceous(?) granitic rocks | Produced 905 g Au and 707 g Ag from 136 tonnes |

DESCRIPTION: Group of quartz veins with gold, pyrite, arsenopyrite, and stibnite. Veins pinch and swell, width ranges from 1 cm to 2.4 m with average of 1 m. Masses of nearly pure stibnite up to 0.6 m thick and 30 m long. Veins occur in Cretaceous(?) granitic rocks intruding middle Paleozoic or older metasedimentary rocks of the Yukon Crystalline terrane. Abundant faults and shears. About 240 m underground workings. Developed from about 1935 to 1941. Minor production in 1970's. SOURCES: Thomas, 1970; Menzie and Foster, 1978; Robinson and others, 1982.

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| EC20.<br>63 53<br>143 28 | Mosquito.<br>Cu, Mo | Porphyry Cu-Mo. Late Cretaceous to early Tertiary quartz monzonite | No data |

DESCRIPTION: Disseminated chalcopyrite, molybdenite, and pyrite in hydrothermally altered Late Cretaceous to early Tertiary quartz monzonite and quartz monzonite porphyry. Granitic rocks intrude middle Paleozoic or older schist of the Yukon Crystalline terrane. SOURCES: Singer and others, 1976.

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| EC21.<br>64 07<br>141 55 | Purdy.<br>Au | Au quartz vein. Middle Paleozoic or older metasedimentary rocks. | Minor production |

DESCRIPTION: Large quartz-calcite fissure vein and veinlets with "lace" gold. Large vein extends about 2 m; terminated at one end by fault. Large vein completely mined by 1960. Vein and veinlets occur in middle Paleozoic or older metasedimentary schists of Yukon Crystalline terrane. Small veins and veinlets mined in 1969 and early 1970's. SOURCES: Helen L. Foster, written commun., 1984; W. David Menzie, written commun., 1985.

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| EC22.<br>63 22<br>142 30 | Asarco.<br>Cu, Mo | Porphyry Cu-Mo. Tertiary quartz porphyry | No data |

DESCRIPTION: Disseminated molybdenite and Cu-sulfides in silicified and leached Tertiary quartz porphyry hypabyssal pluton that intrudes middle Paleozoic or older Yukon Crystalline terrane. SOURCES: Singer and others, 1976; Helen L. Foster, written commun., 1977, in Eberlein and others, 1977.

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| EC23.<br>63 38<br>141 29 | Bluff.<br>Cu, Mo | Porphyry Cu-Mo. Late Cretaceous or early Tertiary granitic rocks | No data |

DESCRIPTION: Disseminated pyrite, chalcopyrite, molybdenite, and magnetite. Hosted in hypabyssal porphyritic granite, granodiorite, and quartz porphryry. Intense hydrothermal alteration. Numerous faults and dikes. Granitic rocks intrude middle Paleozoic or older schist of the Yukon Crystalline terrane. SOURCES: Singer and others, 1976; Eberlein and others, 1977.

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| EC24.<br>63 39<br>141 19 | Taurus.<br>Cu, Mo | Porphyry Cu-Mo. Early Tertiary granite | Estimated 450 million tonnes grading 0.5% Cu and 0.07% Mo |

DESCRIPTION: At least three areas of hypabyssal plutons with intense potassic, propylitic, and sericitic alteration. Chalcopyrite, molybdenite, and pyrite in disseminations and veinlets of quartz-orthoclase-sericite, quartz-magnetite-anhydrite, quartz-sericite-pyrite-clay-fluorite, quartz-orthoclase-biotite, and solid chalcopyrite. Magnetite-rich core of potassic altered granite porphyry with sparse sulfides, and higher concentrations of Cu and Mo sulfides occur with periphery with phyllic alteration. Sequence of alteration, oldest to youngest, from propylitic, hydrothermal potassic and propylitic, phyllic, and argillic. Potassic alteration in core of plutons, propylitic and sericite alteration in periphery and adjacent wallrocks. Local tourmaline, fluorite, and replacement of chalcopyrite by chalcocite. Hosted in granite porphyry, granodiorite, and quartz latite porphyry intruding early Paleozoic or older quartz-sericite schist and gneiss of Yukon Crystalline terrane. Numerous faults and shears. Zone of hypabyssal plutons about 13 km long and 1.6 km wide. SOURCE: Edward R. Chipp, written commun., 1984.

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## SERPENTINE-HOSTED ASBESTOS AND PODIFORM CHROMITE DEPOSITS IN THRUST SLICES OF MAFIC AND ULTRAMAFIC ROCKS, EASTERN YUKON-TANANA UPLAND

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| EC25.<br>64 31<br>142 30 | Slate Creek (Fortymile).<br>Asbestos | Serpentine-hosted asbestos. Serpentinized ultramafic rocks | Estimated 58 million tonnes grading 6.4% fiber |

DESCRIPTION: Antigorite with minor clinochrysotile, chrysotile, magnetite, brucite, and magnesite in serpentinized harzburgite. Chrysotile asbestos occurs in zones of fracturing near centers of thicker serpentinite, primarily as cross-fiber asbestos in randomly oriented veins about 0.5 to 1 cm thick. Veins contain alternating zones of chrysotile and magnetite, and commonly exhibit magnetite selvages. Some chrysotile altered to antigorite. Harzburgite occurs as tabular tectonic lenses, generally from 60 to 150 m thick and up to 800 m long. Ultramafic rocks part of deformed ophiolite. SOURCES: Foster and Keith, 1974; Robert K. Rogers, written commun., 1984.

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| EC26.<br>64 34<br>142 11 | Eagle C3.<br>PGE | Podiform chromite.<br>Biotite pyroxenite | Grab samples with 3 g/t Pt, 1.5 g/t Pd, and 0.03 g/t Rh |

DESCRIPTION: Biotite pyroxenite in small ultramafic body. Locally serpentinized. Only one of 32 separate ultramafic bodies in area that exhibits significant values of PGE. Ultramafic rocks may be part of deformed ophiolite. SOURCES: Foster and Keith, 1974; Foster, 1975.

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## Sb-Au AND POLYMETALLIC VEIN, AND KUROKO MASSIVE SULFIDE DEPOSITS, NORTHERN ALASKA RANGE REGION

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| EC27.<br>63 25<br>151 12 | Slate Creek, Eagles Den, Caribou Creek (Kanitishna District)<br>Sb, Ag, Zn | Sb-Au vein. Middle Paleozoic or older metavolcanic and metasedimentary rocks | Estimated 64,000 tonnes grading 12.0% Sb, minor Ag, Zn |

DESCRIPTION: Quartz-carbonate fissure veins with mainly stibnite. Mostly free of other sulfides common to district. Veins occur along northeast-southwest-striking, steeply dipping fault zones crossing middle Paleozoic or older Yukon Crystalline terrane. SOURCES: Bundtzen, 1981; Thomas K. Bundtzen, written commun., 1984.

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| EC28.<br>63 33<br>150 45 | Quigley Ridge (Kantishna District).<br>Ag, Au, Pb, Zn | Polymetallic vein. Middle Paleozoic or older metavolcanic and metasedimentary rocks | Estimated 380,000 tonnes grading 1,300 g/t Ag, 4.8 g/t Au, 6.4% Pb, 2.3% Zn |

DESCRIPTION: Quartz-carbonate fissure veins with galena, sphalerite, tetrahedrite, pyrite, chalcopyrite, and siderite. Paragenetic sequence, from older to younger, of arsenopyrite, pyrite, base-metal sulfides, Ag sulfosalts, stibnite, and covellite. Locally contain Ag and Pb sulfosalts. Veins occur along northeast-southwest-striking, steeply dipping fault zones in the Spruce Creek sequence. SOURCES: Bundtzen, 1981, 1983a; Thomas K. Bundtzen, written commun., 1984.

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| EC29.<br>63 34<br>150 44 | Banjo (Kantishna District).<br>Au, Ag, Pb, Zn, Sb | Polymetallic vein. Middle Paleozoic or older metavolcanic and metasedimentary rocks | Estimated 160,000 tonnes grading 13.4 g/t Au, 123 g/t Ag, 1.5% combined Pb, Zn, Sb |

DESCRIPTION: Quartz-carbonate fissure veins with arsenopyrite, pyrite, gold, and minor scheelite. Veins occur along northeast-southwest-striking, steeply dipping fault zones within the Spruce Creek sequence. SOURCES: Bundtzen, 1981, 1983a; Thomas K. Bundtzen, written commun., 1984.

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| EC30.<br>63 35<br>151 35 | Spruce Creek (Kantishna District).<br>Au, Ag, Pb, Zn, Sb | Polymetallic vein. Middle Paleozoic or older metavolcanic and metasedimentary rocks | Estimated 77,000 tonnes grading 2.4 g/t Au, 276 g/t Ag, 2.5% combined Pb, Zn, Sb |

DESCRIPTION: Quartz-carbonate fissure veins with galena, sphalerite, arsenopyrite, and gold. Veins occur along northeast-southwest-striking, steeply dipping fault zones in the Spruce Creek sequence. SOURCES: Bundtzen, 1981, 1983a; Thomas K. Bundtzen, written commun., 1984.

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| EC31.<br>63 45<br>150 25 | Stampede (Kantish-<br>District).<br>Sb | Polymetallic or Sb-Au vein. Middle Paleozoic or older metavolcanic and metasedimentary rocks | Estimated 410,000 tonnes grading 10.5% Sb, with minor Ag, Zn, Au. Produced 1,570 tonnes |

DESCRIPTION: Quartz-carbonate fissure veins with stibnite, and minor pyrite and sphalerite in pods and kidneys. Massive stibnite zones from 1 cm to 5 m wide. Extensive vein system localized in a 5 km long, northeast-southwest-trending fault system. Veins formed before, during, and after several periods of movement on fault. Paragenetic sequence, from older to younger, of pyrite, sphalerite, and stibnite. Fault system in the middle Paleozoic or older Spruce Creek sequence. Production from 1937 to 1970. About 1,000 m of underground workings on two levels. SOURCES: Barker, 1963a; Bundtzen, 1981, 1983a; Thomas K. Bundtzen, written commun., 1984.

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| EC32.<br>64 37<br>148 51 | Liberty Bell.<br>Au, Ag, Cu, Bi | Kuroko massive sulfide(?). Mississippian(?) Totatlanika Schist | Estimated 91,000 tonnes grading 34.3 g/t Au, 10% As, 2.0% Cu |

DESCRIPTION: Fine-grained arsenopyrite, chalcopyrite, pyrrhotite, and bismuthite stringers and laminations that occur parallel to foliation. The sulfide zone reaches a maximum thickness of 10 m and is 200 m long. The laminations vary from a few centimeters to 1 m thick. Lenses and laminations parallel foliation in enclosing siliceous metavolcanic phyllite of the California Creek Member of the Mississippian(?) Totatlanika Schist, but are locally folded. Quartz-tourmaline-sulfide veins from 10 cm to 1 m thick crosscut sulfide zones and adjacent schist, locally with symmetrical wallrock alteration. The sulfides occur immediately adjacent to a metamorphosed porphry interpreted as a Paleozoic igneous plug that was contemporaneous with the volcanic rock protoliths of the Totatlanika Schist. Quartz veins may represent either remobilized stratiform sulfides, or polymetallic

veins associated with nearby Tertiary(?) mafic dikes. Gold produced in 1930's. SOURCES: Hawley, 1976; E. R. Pilgram, written commun., 1976; Gilbert and Bundtzen, 1979; Bundtzen and Gilbert, 1983; Thomas K. Bundtzen, written commun., 1985; Bundtzen and Smith, 1986.

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| EC33.<br>63 54<br>148 17 | Sheep Creek.<br>Zn, Pb, Sn | Kuroko massive sulfide. Precambrian or Paleozoic Keevy Peak Formation | Grab samples with up to 15% combined Pb and Zn, 102 g/t Ag; zones up to 1 m wide with 1% Sn |

DESCRIPTION: Fine-grained sphalerite, galena, and pyrite in massive lenses in siliceous phyllite and metaconglomerate of the Precambrian or Paleozoic Keevy Peak Formation. Sulfide zone extends along strike for 300 m, and vertically for 200 m. Sulfide lenses isoclinally folded and possibly associated with tuffaceous chlorite schist. SOURCE: Thomas K. Bundtzen, written commun., 1985.

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| EC34.<br>63 48<br>147 57 | Anderson Mountain.<br>Cu, Pb, Zn, Ag | Kuroko massive sulfide. Mississippian(?) Totatlanika Schist | Grades from 0.5 to 19% Cu, up to 5% Pb, 28% Zn, and 171 g/t Ag |

DESCRIPTION: Massive sulfide layers with pyrite, chalcopyrite, galena, sphalerite, enargite, and arsenopyrite with gangue of quartz, sericite, chlorite, calcite, barite and siderite. Hosted in metamorphosed marine tuffaceous rhyolite and metamorphosed calcareous clastic rocks correlated with the Moose Creek Member of the Totatlanika Schist. Numerous high-angle faults. Sulfide beds appear to lie on irregular paleosurface in footwall. Domal sulfide accumulations at top of layers. Absence of footwall alteration and stringer mineralization suggests off-vent deposition. High trace values of As, Sb, Hg, and W may be derived from schist basement. SOURCES: Gilbert and Bundtzen, 1979; Curtis J. Freeman, written commun., 1984; Thomas K. Bundtzen, written commun., 1984.

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| EC35.<br>63 45<br>147 22 | WTF, Red Mountain.<br>Cu, Pb, Zn, Ag, Au | Kuroko massive sulfide. Mississippian(?) Totatlanika Schist | Estimated 1.10 million tonnes grading 0.15% Cu, 2.5% Pb, 7.9% Zn, 270 g/t Ag, and 1.9 g/t Au at WTF |

DESCRIPTION: Massive pyrite, sphalerite, galena, and chalcopyrite with quartz-rich gangue in felsic metavolcanic rocks derived from crystal and lapilli tuff, minor flows, and in metasedimentary rocks. Massive sulfide layers on both sides of large east-west trending syncline. Proximal setting for Red Mountain deposit on south limb with sulfide-silica exhalite up to 130 m thick hosting massive sulfide layers. An older, southern horizon hosts sphalerite and coarse pyrite in black chlorite schist. Distal setting for WTF deposit on north limb with thin blanket of fine-grained sulfides. Deposits occur immediately below the Sheep Creek Member and above the Mystic Creek Member of the Totatlanika Schist. SOURCE: David R. Gaard, written commun., 1984.

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| EC36.<br>63 41<br>146 39 | Miyaoka, Hayes Glacier.<br>Cu, Pb, Zn, Au, Ag | Kuroko massive sulfide. Devonian metavolcanic and metasedimentary rocks | Grab samples with up to 0.92% Cu, 0.72% Pb, 0.5% Zn, 50 g/t Au, 50 g/t Ag |

DESCRIPTION: Zone of massive sulfide lenses, pods, and disseminations with pyrrhotite, chalcopyrite, sparse pyrite, and sphalerite. Zone about 13 km long and up to 0.5 km wide. Individual lenses and pods up to 5 m long and 1 m thick. Sulfides occur in interfoliated former marine sequence of quartz mica, muscovite-chlorite-quartz, quartz-feldspar augen schist, chlorite schist, calc-schist, and marble. Host rocks derived from Devonian felsic to intermediate volcanic rocks, mainly andesite, dacite, and quartz keratophyre flows and tuffs, and Devonian or older shale, marl, and marble. Metavolcanic and metasedimentary rocks part of Yukon Crystalline terrane. Two periods of metamorphism and deformation, older lower of amphibolite facies, and younger of lower greenschist facies. Intensely deformed with local abundant mylonite schist. SOURCES: Lange and Nokleberg, 1984; Nokleberg and Lange, 1985.

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| EC37.<br>63 36<br>146 14 | McGinnis Glacier.<br>Zn, Cu, Pb, Ag | Kuroko massive sulfide.<br>Devonian metavolcanic and metasedimentary rocks | Grab samples with up to 2.3% Zn, 0.26% Cu, 0.25% Pb, 50 g/t Ag |

DESCRIPTION: Disseminated to massive pyrite, chalcopyrite, and sphalerite in two or three layers exposed discontinuously in a zone up to about 15 m thick and 2 km long. Individual massive pods up to 1 m thick. Gangue of quartz, chlorite, epidote, biotite, and actinolite. Sulfides occur in interfoliated marine sequence of metasedimentary rocks, mainly quartz schist, chlorite-quartz schist and marble, and lesser amounts of metamorphosed Devonian andesite, dacite, and keratophyre flows, tuff, and volcanic graywacke. Metavolcanic and metasedimentary rocks part of Yukon Crystalline terrane. Two periods of metamorphism and deformation, older lower of amphibolite facies, and younger of lower greenschist facies. Intensely deformed with local abundant mylonite schist. SOURCES: Lange and Nokleberg, 1984; Nokleberg and Lange, 1985.

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| EC38.<br>63 14<br>144 10 | Delta District.<br>Pb, Zn, Cu, Ag, Au | Kuroko massive sulfide.<br>Devonian metavolcanic and metasedimentary rocks | Largest deposit of 18 million tonnes grading 0.3 to 0.7% Cu, 1 to 3% Pb, 3 to 6% Zn, 34 to 100 g/t Ag, 1 to 3.4 g/t Au |

DESCRIPTION: Large massive sulfide district of about 1,000 sq km, with about 26 stratiform, transposed, and lesser replacement deposits occurring along four regional trends. Consist of varying amounts of pyrite, chalcopyrite, galena, sphalerite, and lesser malachite and bornite. Gangue of mainly quartz, carbonate, and white mica. Associated hydrothermal alteration with formation of chlorite, quartz, sericite, pyrite, and lead-silver-gold sulfides. Massive sulfides and adjacent layers with disseminated sulfides occur in zones typically 500 m long, 200 m wide, and 15 m thick. Hosted in metamorphosed Devonian spilite and keratophyre suite of flows, tuffs, and breccia, and metamorphosed shallow- and deep-marine sedimentary rocks, mainly quartz schist, quartz-chlorite-feldspar schist, calc-schist, and marble. Metavolcanic and metasedimentary rocks part of Yukon Crystalline terrane. Abundant numerous tholeiitic greenstone sills with spatial relationship to massive sulfide bodies, and possible genetic relationship to metavolcanic suite. SOURCES: Nauman and others, 1980; Lange and Nokleberg, 1984; Clint R. Nauman and Steven R. Newkirk, written commun., 1984; Ian M. Lange and Warren J. Nokleberg, written commun., 1984.

## SIGNIFICANT METALLIFEROUS LODE DEPOSITS, ALEUTIAN ISLANDS AND ALASKA PENINSULA

By Frederic H. Wilson, Gary L. Anderson, Thomas K. Bundtzen, and Warren J. Nokleberg, with contributions from Dennis P. Cox, Robert L. Detterman, and Carl I. Steefel

| MAP NUMBER. LATITUDE LONGITUDE | NAME. COMMODITIES | TYPE. GEOLOGIC HOST UNIT | TONNAGE AND GRADE. PRODUCTION, IF KNOWN |
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### POLYMETALLIC AND EPITHERMAL VEIN, PORPHYRY Cu, Mo AND Cu-Mo DEPOSITS, ALEUTIAN ISLANDS AND SOUTHWESTERN ALASKA PENINSULA

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| AP1.<br>53 45<br>166 10 | Sedanka (Biorka).<br>Zn, Pb, Cu | Polymetallic vein.<br>Tertiary diorite | Average grade of 6.8% Zn, 0.45% Cu, 0.29% Pb, 1.37 g/t Au, 48 g/t Ag |

DESCRIPTION: Sphalerite and pyrite, and minor galena and chalcopyrite in disseminations in fault zone striking east-northeast and dipping moderately south. Quartz and ankerite gangue. Fault zone with sulfides at least 1,000 m long, and up to 80 m thick. Hanging wall of Tertiary diorite and footwall of greenstone. NOTE: Plate 1 does not contain area of this deposit (Sedanka Island). SOURCE: Webber and others, 1946.

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| AP2.<br>55 35<br>161 16 | Canoe Bay.<br>Au, Ag, Hg, As, Pb, Zn | Epithermal vein. Late Tertiary or Quaternary felsic igneous rocks | No data |

DESCRIPTION: Quartz-cemented breccia with gold in altered late Tertiary or Quaternary felsic intrusive and extrusive rocks consisting of rhyolite to rhyodacite porphyry, and vent, explosion, and lithic breccia. Associated crystal tuff, and andesite to dacite dikes. Core area with sericite, pyrite, argillite, and silica alteration grading outward into weak propylitic alteration. Anomalous soil and rock values of Au, Ag, Hg, As, Pb, and Zn. Intrusive rocks intrude shale, sandstone, and conglomerate of the Cretaceous Hoodoo(?) Formation. SOURCES: Gary L. Andersen, written commun., 1984; Frederic H. Wilson, written commun., 1985.

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| AP3.<br>55 11<br>160 40 | Aquila.<br>Au, Ag | Epithermal vein.<br>Tertiary andesite flows and tuffs | Grab samples with up to 7.8 g/t Au, 27 g/t Ag |

DESCRIPTION: Quartz fissure vein system with gold. Veins extend up to 2,700 m and occur along northeast-southwest-striking regional fractures, a few kilometers apart, and parallel to similar fractures that host Apollo-Sitka deposit (AP4, below). Deposit restricted to small shoots occurring at intersections of veins or where veins abruptly change strike. Argillic and silicic alteration generally restricted to narrow envelopes around individual quartz veins. Veins hosted in Tertiary andesite flows and tuffs. SOURCE: Gary L. Andersen, written commun., 1984.

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| AP4.<br>55 12<br>160 37 | Apollo-Sitka.<br>Au, Ag, Pb, Zn, Cu | Epithermal vein.<br>Tertiary intermediate volcanic rocks | Produced about 3.3 million g Au from 435,000 tonnes ore grading 7.7 g/t Au. Estimated 163,000 tonnes remaining. Portions of drill core with up to 7.3 g/t Au, 240 g/t Ag |

DESCRIPTION: Quartz-calcite-orthoclase veins and silicified zones with gold, galena, sphalerite, chalcopyrite, and native copper. Veins and zones in intensely developed northeast-southwest-striking fracture systems. Veins extend to at least 420 m below surface. At least eight major vein-fracture systems. Veins range from a few centimeters to 7 m wide. Higher grade parts of deposit occur in tensional flexures in the vein-fracture

system. Abundant comb structure and euhedral crystal druses indicate vein formation at shallow depths. Hosted in extensively propylitically altered Tertiary tuff and intermediate volcanic rocks. Main production from 1894 to 1906. About 5,100 m of underground workings. SOURCES: Martin, 1905, Brown, 1947; Alaska Mines and Geology, 1983.

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| AP5.<br>55 12<br>160 35 | Shumagin.<br>Au, Ag | Epithermal vein.<br>Middle Tertiary volcanic rocks. | Estimated 540,000 tonnes grading 10.3 g/t Au, 34.3 g/t Ag; includes 256,000 tonnes grading 14.6 g/t Au and 54.9 g/t Ag |

DESCRIPTION: Quartz fissure system with gold hosted in Tertiary (Miocene?) andesitic volcanic rocks. Estimated tonnage in area 2,700 m long, 610 m wide, and 120 m deep. Fissure system occurs on same northeast-southwest-trending structure as Aquila deposit (AP3, above). Extensive drilling in 1982 and 1983. SOURCE: Gary L. Anderson, written commun., 1985.

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| AP6.<br>55 37<br>160 41 | Pyramid.<br>Cu, Au | Porphyry Cu.<br>Late Tertiary dacite porphyry stock | Estimated 110 million tonnes grading 0.4% Cu, 0.05% Mo, and trace of Au |

DESCRIPTION: Disseminated molybdenite and chalcopyrite(?) in iron-stained dacite porphyry stocks and dikes of late Tertiary age. Zonal alteration pattern with core of secondary biotite and about 3 to 10% magnetite, grading outward to envelope of quartz-sericite alteration. Peripheral sericite filled fractures adjacent to stock. Local oxidation and supergene enrichment blanket up to 100 m thick with mainly secondary chalcocite and covellite. Deposit centered on 3 sq km area within stock. Stock intrudes fine-grained clastic rocks of the Upper Cretaceous Hoodoo Formation, and Paleocene or Eocene to Oligocene Stepovak(?) or Tolstoi(?) Formation. Sedimentary rocks contact metamorphosed adjacent to stock. Local smaller stocks. SOURCES: Armstong and others, 1976; Hollister, 1978; Wilson and Cox, 1983; Gary L. Anderson, written commun., 1984; Robert L. Detterman, oral commun., 1986.

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| AP7.<br>56 38<br>160 31 | San Diego Bay.<br>Ag, Au, Cu, Pb, Zn | Epithermal vein(?).<br>Middle Tertiary dacite | No data. |

DESCRIPTION: Area of propylitic, and local argillite or silicic alteraton in Tertiary dacite flows. Fe-stained 61 sq km area. Rock samples from altered area contain 0.5% to 5.0% pyrite. Numerous small quartz veins with anomalous Ag and Cu, and lesser Cu-, Pb-, and Zn-sulfides. Quartz veins in altered middle Tertiary dacite. Veins and altered area may be upper level part of porphyry Cu deposit. SOURCE: Gary L. Andersen, written commun., 1984.

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| AP8.<br>55 57<br>159 24 | Kawisgag (Ivanof).<br>Cu, Mo, Au | Porphyry Cu and (or) polymetallic vein. Late Tertiary intrusive complex | Grab samples with 0.2 to 1.0% Cu, up to 0.024% Mo, and 0.23 to 0.4 g/t Au. Small tonnage |

DESCRIPTION: Area of intense sericitic and less well developed potassic alteration in nonmarine fluvial volcanic sandstone and conglomerate of the lower Tertiary Tolstoi Formation and black siltstone of the Upper Cretaceous Hoodoo(?) Formation. Minor propylitic alteration on periphery. Sedimentary rocks intruded by number of small stocks and dikes. Alteration overprinted on contact-metamorphic auroles around stocks. Iron-stained area of about 2.5 sq km. Area of hydrothermal alteration about 200 by 700 m. SOURCES: R. F. Robinson, written commun., 1975; Frederic H. Wilson and Robert L. Detterman, written commun., 1985.

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| AP9.<br>56 10<br>158 20 | Warner Bay<br>(Prospect Bay).<br>Cu, Mo, Pb, Zn | Polymetallic vein.<br>Late Tertiary grano-<br>diorite | Average grade of 0.3% Cu; up to 0.7% Cu. Unknown Mo grade |

DESCRIPTION: Disseminated molybdenite and chalcopyrite along joint surfaces in closely jointed granodiorite. Galena and sphalerite in veins parallel to main set of joints, or in distinct hematite-rich breccia zones. Hosted in several square kilometer area in the late Tertiary Devils batholith grading from quartz diorite to granodiorite. Little to no sericite or argillite alteration. Diatreme or breccia pipe at north end of deposit contains clasts of propylitically altered granodiorite cemented by galena, sphalerite, pyrite, calcite, and zeolites. SOURCES: Atwood, 1911; Wilson and Cox, 1983; Thomas K. Bundtzen, written commun., 1984.

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| AP10.<br>56 30<br>158 44 | Cathedral Creek,<br>Braided Creek.<br>Cu, As, Zn, Pb | Polymetallic vein.<br>Late Tertiary andesite<br>to dacite stocks | No data |

DESCRIPTION: Quartz, arsenopyrite, sphalerite, chalcopyrite, and galena in veins adjacent to various late Tertiary stocks of pyroxene andesite, hornblende andesite, and biotite dacite. Textures and field relations indicate shallow emplacement of stocks. Minor chalcopyrite and pyrite in zones of sericite alteration in stocks and adjacent sedimentary rocks. Stocks intruded into the Chignik, Hoodoo, Tolstoi, and Meshik Formations. Stock at Cathedral, at Bee Creek (AP12, below), and others in area aligned along 65 km east-west-trending lineament that ends at Black Peak, a Holocene volcanic center. SOURCES: R. F. Robinson, written commun., 1975; Cox and others, 1981; Wilson and Cox, 1983; Frederic H. Wilson, written commun., 1985.

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| AP11.<br>56 14<br>158 30 | Mallard Duck Bay.<br>Cu, Mo | Porphyry Cu-Mo and (or)<br>polymetallic vein(?).<br>Oligocene andesite flows,<br>breccias, lahars | No data |

DESCRIPTION: Pyrite, chalcopyrite, and molybdenite veinlets in swarms concentrated along intersection joint systems. Cut by numerous diorite dikes. Intense sericitic alteration over several square kilometers with weak propylitic alteration to northwest. SOURCE: Wilson and Cox, 1983.

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| AP12.<br>56 31<br>158 24 | Bee Creek.<br>Cu, Au | Porphyry Cu.<br>Late Tertiary dacite<br>stock | Grab samples grading up to 0.25% Cu, 0.01% Mo, 0.06 g/t Au. Estimated 4.5 to 9.1 million tonnes grading 0.25% Cu, 0.01% Mo, and trace Au |

DESCRIPTION: Disseminated chalcopyrite in arkosic sandstone near late Tertiary hypabyssal dacite stock. Zonal alteration pattern with a potassic-altered core, and a propylitically altered periphery. Sericite alteration superposed on both core and periphery. Altered part of dacite stock about 3 sq km in area. Stock intruded into the Upper Jurassic Naknek Formation. SOURCES: E. D. Fields, written commun., 1977; Cox and others, 1981; Wilson and Cox, 1983; Robert L. Detterman, oral commun., 1986.

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| AP13.<br>57 12<br>157 00 | Rex.<br>Cu, Au | Porphyry Cu.<br>Early Tertiary andesite<br>stocks | No data |

DESCRIPTION: Stockwork of chalcopyrite, pyrite, and molybdenite in disseminations and on coatings on joint surfaces in series of closely fractured, small hypabyssal andesite stocks. Hematite zones in brecciated hornfels in contact metamorphic aureole. Stock about 3 sq km in area. Stocks intrudes the lower Tertiary Tolstoi Formation and overlying volcanic rocks of the Meshik Formation. K-Ar ages of stocks and hydrothermal alteration range from 34 to 39 m.y. Drilling in 1977. SOURCES: Thomas K. Bundtzen, written commun., 1984; Frederic H. Wilson, written commun., 1985.

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| AP14.<br>57 03<br>157 13 | Mike.<br>Mo, Au, Ag, Pb, Zn | Porphyry Mo.<br>Pliocene dacite and rhyodacite stock | Grab samples with >20 g/t Mo |

DESCRIPTION: Area of intense silicic alteration, and weak propylitic and potassic alteration, and disseminated molybdenite, pyrite, and chalcopyrite on joint surfaces with local pyrite zones in fractured Pliocene dacite and rhyodacite stock intruding sandstone, conglomerate, and siltstone of the Jurassic Naknek Formation. Samples with anomalous Au, Ag, and Mo from center of altered zone, and with anomalous Pb and Zn on periphery of altered zone. K-Ar age of 3.65 m.y. for stock. Drilling in 1977. SOURCES: Frederic H. Wilson and Dennis P. Cox, written commun., 1985; Robert L. Detterman, oral commun., 1986.

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| AP15.<br>57 11<br>156 24 | Kilokak Creek.<br>Pb, Zn | Polymetallic vein(?).<br>Late Cretaceous Hoodoo Formation and younger volcanic rocks | No data |

DESCRIPTION: Zone of alteration and sparse veins with anomalous Pb and Zn values in black siltstone of the Upper Cretaceous Hoodoo Formation, and shallow-water to nonmarine sandstone, shale, and conglomerate of the Chignik Formation, and in Eocene(?) volcanic and hornblende andesite plug. Little aleration in andesite plug; extensive disseminated pyrite in country rock surrounding plug. Zone of alteration and sparse veins on periphery of, and predating the Pliocene Agripina Bay (granodiorite) batholith. SOURCE: Frederic H. Wilson, written commun., 1985.

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| AP16.<br>59 16<br>154 38 | Kuy.<br>Au, Ag, Cu | Epithermal vein.<br>Tertiary andesite to dacite flows | No data |

DESCRIPTION: Quartz veins and quartz vein breccia with gold-silver tellurides and chalcopyrite. Veins occur in gash fractures striking west-northwest and dipping steeply southeast. Fracture zone about 300 m wide and 900 m long. Veins exposed for about 90 m along strike. Abundant vugs and comb quartz. Flattened rod shape and steep southeast plunge for individual quartz bodies. Veins and fracture system hosted in dacite tuff breccia unit that is part of upper levels of dissected Tertiary summit caldera. Fracture zone exhibits intense argillite and pyrite alteration; silicic alteration occurs in narrow envelope surrounding quartz veins. Older basement of Mesozoic(?) sedimentary rocks. SOURCE: Gary L. Andersen, written commun., 1984.

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| AP17.<br>59 31<br>154 23 | Fog Lake (Pond).<br>Au, Cu, Ag | Epithermal vein.<br>Tertiary dacite tuffs, lahars, and breccias | Grab samples with up to 37 g/t Au, 5 g/t Ag, >0.5% Cu |

DESCRIPTION: Zone of pyrite and chalcopyrite in swarms of veinlets in altered quartz porphyry intruding Tertiary dacite tuffs, lahars, and breccias. Zone about 550 by 305 m; best developed at intersections of northwest-, northeast-, and east-northeast-trending structures. Argillic alteration in envelopes about 7 cm wide adjacent to veinlets. Outer, weaker propylitic alteration. Deposit grades to sphalerite and minor galena with anomalous Ag and Au toward northwest. Quartz porphry altered to sericite and pyrite; propylitic alteration in adjacent volcanic rocks. Dacite tuffs, lahars, and breccia, and associated agglomerate and conglomerate unconformably overlie Late Cretaceous to Paleocene(?) quartz diorite to granodiorite pluton. Andesite to dacite dikes crosscut volcanic rocks. SOURCES: Reed, 1967; Gary L. Andersen, written commun., 1984.

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| AP18.<br>59 08<br>154 40 | Crevice Creek (McNeil).<br>Au, Ag, Cu, Fe | Cu-Au skarn.<br>Upper Triassic limestone, chert, and argillite | Produced 11 tonnes grading 4.5 g/t Au, 514 g/t Ag, and and 17.5% Cu from high grade zones |

DESCRIPTION: At least ten epidote-garnet skarn bodies occurring in limestone in a 2 sq km area adjacent to southwest part of the Jurassic(?) granodiorite stock of Pilot Knob. Skarn bodies 3 to 800 m long and a few centimeters to 60 m wide. Magnetite-rich skarn in isolated pods in nearby metavolcanic rocks. Skarn bodies hosted in limestone, chert, and argillite of the Upper Triassic Kamishak Formation and in overlying metavolcanic rocks of the Jurassic Talkeetna Formation. Local disseminated magnetite zones in epidote-garnet skarns. Largest skarn body at Sargent Creek contains epidote, garnet, actinolite, quartz, pyrite, and chalcopyrite. Lenses up to 1 m wide and 10 m long average 7% Cu. Numerous magnetic anomalies in area surrounding granodiorite stock. SOURCES: Martin and Katz, 1912; Richter and Herreid, 1965.

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| AP19.<br>60 13<br>154 05 | Kasna Creek (Kontrashibuna).<br>Cu, Au, Ag, Fe | Fe skarn.<br>Upper Triassic dolomite | Chip samples averaging 0.95% Cu, 27% Fe, traces of Au, Ag. Grab samples with up to 0.25% Zn. Estimated 9.1 million tonnes grading 1% Cu |

DESCRIPTION: Skarn bodies with specular hematite and lesser magnetite and chalcopyrite with gangue amphibole, chlorite, calcite, and quartz replacing Upper Triassic dolomite and limestone. Replacement occurs parallel to bedding. Skarn bodies occur in zone about 320 m long and 700 m wide adjacent to Jurassic tonalite. Tuffs, mafic volcanic rocks, and agglomerate occur with limestone. SOURCES: Warfield and Tutledge, 1951; Reed and Lanphere, 1969; Eakins, 1970.

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| AP20.<br>60 14<br>152 51 | Magnetite Island. (Tuxedni Bay).<br>Fe, Ti | Fe skarn.<br>Upper Triassic marble | Zones with 20 to 75% magnetite. Up to several thousand tonnes magnetite |

DESCRIPTION: Two skarn bodies with magnetite replacing upper Paleozoic to lower Mesozoic marble. Skarn bodies occur in northeast-southwest-striking faults in Upper Triassic marble and associated sedimentary and volcanic rocks adjacent to Jurassic quartz diorite pluton. Disseminated magnetite in hornfels in eastern deposit. Massive magnetite and garnet between marble hanging wall and hornfels footwall in western deposit. SOURCES: Grantz, 1956; Detterman and Hartsock, 1966.

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| AP21.<br>60 07<br>152 57 | Johnson Prospect.<br>Au, Zn, Cu, Pb | Epithermal vein(?).<br>Lower Jurassic Talkeetna Formation | Average grade of 21 to 41.2 g/t Au, 9.4 to 24.8% Zn, 2.8% Pb, and 1.7% Cu |

DESCRIPTION: Quartz-sulfide vein stockwork with chalcopyrite, pyrite, sphalerite, galena, and gold. Stockwork occurs in a discordant, pipelike body of silicified volcanic rocks. Veins also contain chlorite, sericite, anhydrite, and barite alteration. Deposit occurs in volcaniclastic, pyroclastic, and volcanic rocks, part of the Portage Creek Agglomerate Member of the Lower Jurassic Talkeetna Formation. Nearby Late Jurassic quartz diorite and quartz monzonite. SOURCES: R. L. Detterman, oral commun., 1984; Carl I. Steefel, written commun., 1984.

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| AP22.<br>60 17<br>154 15 | Kijik River.<br>Cu, Mo | Polymetallic vein and porphyry Cu. Early Tertiary dacite porphyry | Grab samples with up to 0.25% Cu, and 0.17% Mo in a 3 square km area. Estimated 91 million tonnes |

DESCRIPTION: Large area of low-grade, disseminated sulfides in, and adjacent to early Tertiary dacite porphyry. Distinctive orange gossan over a 3 sq km area with extensive stockwork, and zones of sericite and sulfides. Extensive propylitic and silicic alteration of dacite porphyry. Early Tertiary dacite porphyry intrudes older volcanic rocks. SOURCES: Eakins and others, 1978; Nelson and others, 1985; Thomas K. Bundtzen, written commun., 1984.

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| AP23.<br>60 45<br>154 30 | Bonanza Hills.<br>Ag, Cu, Pb, Au | Polymetallic vein and porphyry Cu. Late Cretaceous granite and associated volcanic rocks | At Main Saddle estimated 45,000 tonnes grading 81 g/t Ag, 0.15% Cu, 0.67% Pb, and 0.15 g/t Au |

DESCRIPTION: Main Saddle: tetrahedrite, arsenopyrite, galena, and chalcopyrite in quartz-limonite vein up to 3 m wide and 150 m long. Vein hosted in contact-metamorphosed dacite flow and sandstone sequence near two-mica hypabyssal granite pluton. VABM Trail and Bonanza: stibnite, arsenopyrite, and gold in en-echelon veinlets adjacent to dacite porphyry and quartz monzonite plutons. Extensive sericite and silicic alteration of pluton rocks. Plutons intrude Lower Cretaceous shale and sandstone, part of extensive Upper Jurassic and Lower Cretaceous flysch in region. SOURCES: Eakins and others, 1978; Thomas K. Bundtzen, written commun., 1984; Nelson and others, 1985.

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| AP24.<br>60 51<br>153 12 | Glacier Fork.<br>Cu, Zn, Au, Ag | Cu-Zn skarn. | Chip samples grading 0.76% Cu, 3.4% Zn, 0.38 g/t Au, 20 g/t Ag |

DESCRIPTION: Layers and veinlets of disseminated and massive pyrrhotite, chalcopyrite, arsenopyrite, and sphalerite in iron-poor, garnet-rich skarn. Skarn occurs in large roof pendant in granitic rocks. SOURCE: Nelson and others, 1985.

## SIGNIFICANT METALLIFEROUS LODE DEPOSITS, SOUTHERN ALASKA

By Warren J. Nokleberg, with contributions from Thomas K. Bundtzen, Ian. M. Lange, Clint R. Nauman, Steven W. Nelson, Rainer J. Newberry, Donald H. Richter, Richard C. Swainbank, and Gregory Thurow

| MAP NUMBER. LATITUDE LONGITUDE | NAME. COMMODITIES | TYPE. GEOLOGIC HOST UNIT | TONNAGE AND GRADE. PRODUCTION, IF KNOWN |
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### POLYMETALLIC AND Cu-Au QUARTZ VEIN, Sn GREISEN AND VEIN, Cu-Pb-Zn SKARN, PORPHYRY Mo AND Cu-Mo, GABBROIC Ni-Cu, BESSHI MASSIVE SULFIDE, AND Sn GREISEN DEPOSITS, SOUTHWESTERN AND WESTERN ALASKA RANGE

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| SO1.<br>62 11<br>153 40 | Bowser Creek (Farewell District).<br>Ag, Pb, Zn | Pb-Zn skarn.<br>Felsic dike in early Tertiary granitic pluton | Estimated 14,000 tonnes grading 1,300 g/t Ag, and up to 10% combined Pb and Zn. Estimated 272,000 tonnes with 20% Pb and Zn, and 100 g/t Ag |

DESCRIPTION: Pyrrhotite, sphalerite, galena, and chalcopyrite in a hedenbergite-johannsenite endoskarn occurring in marble adjacent to felsic dike. Local fissures with Ag-rich galena and pyrrhotite occur within marble adjacent to skarn. Nearby small Zn- and Cu-rich stockwork veinlets in plutons, and disseminated sulfides in plutons and endoskarn. SOURCES: Bundtzen and others, 1984b; Szumigala, 1984.

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| SO2.<br>62 14<br>154 20 | Chip-Loy (Farewell District).<br>Ni, Co, Cu | Gabbroic Ni-Cu(?).<br>Ordovician shale | Estimated 9,100 tonnes grading 1% Ni, 0.1% Co |

DESCRIPTION: Massive to disseminated pyrrhotite, bravoite, and chalcopyrite in irregular, steeply dipping layer. Occurs along contact between diabase and Ordovician shale. Other nearby Ni-Co massive sulfide deposits occur along contacts between diabase dikes. SOURCES: Herreid, 1968; Gilbert and Solie, 1983; Bundtzen and others, 1985.

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| SO3.<br>62 14<br>153 48 | Rat Fork, Sheep Creek (Farewell district.<br>Cu, Zn, Pb | Cu-Pb-Zn skarn.<br>Lower Paleozoic marble | Grab samples with up to 3% Cu and 10% combined Zn, Pb |

DESCRIPTION: Large slivers of Cu- and Zn-rich skarn between Tertiary granodiorite dikes in a 3-km-wide dike swarm. Johannsenite-sphalerite skarn in marble, and chalcopyrite-rich garnet endoskarn in dikes. Local Ag-rich galena vein in marble about 0.5 km north of dike swarm. Dikes trend east-west; skarn up to 25 m wide. SOURCES: Herreid, 1968; Reed and Elliott, 1968a, b; Bundtzen and others, 1984b, 1985; Szumigala, 1984.

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| SO4.<br>62 23<br>153 38 | Tin Creek.<br>Pb, Zn, Cu | Cu-Pb-Zn skarn. Lower Paleozoic marble and Tertiary granodiorite | Estimated 230,000 tonnes with 16% combined Pb and Zn |

DESCRIPTION: Pyroxene-rich skarn with abundant sphalerite and minor chalcopyrite, and garnet skarn with chalcopyrite and minor sphalerite. Local abundant epidote and amphibole. Pyroxene skarn distal, and garnet skarn proximal to extensive Tertiary granodiorite dike swarm. SOURCES: Herreid, 1966; Reed and Elliott, 1968a, b; Bundtzen and others, 1984b, 1985; Szumigala, 1985.

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| SO5.<br>62 40<br>152 30 | Shellebarger Pass.<br>Cu, Ag, Fe, Zn | Besshi massive sulfide.<br>Mesozoic pillow basalt | Estimated several hundred thousand tonnes of unknown grade. Up to 5% Cu, average of 2% Cu, 1% Zn |

DESCRIPTION: Very fine grained mixture of mainly pyrite and marcasite with lesser sphalerite, chalcopyrite, galena, and pyrrhotite in a gangue of siderite, calcite, quartz, and dolomite. Sulfides and gangue occur in lenticular massive sulfide bodies, as replacements of carbonate-rich beds, and as fracture fillings, mainly in chert and siltstone. Host rocks of Triassic and (or) Jurassic age consist of lower sequence of chert, dolomite, siltstone, shale, volcanic graywacke, conglomerate, aquagene tuff, and upper sequence of pillow basalt, agglomerate, and breccia. At least six individual sulfide bodies. Highest chalcopyrite concentrations in basal parts of deposits. Minor sphalerite in or near hanging wall zones. Main sulfide bodies may be proximal to basaltic flow fronts. Extensive hydrothermal alteration in footwall; rare to absent in hanging wall. High background Cu values of 250 to 300 g/t. SOURCES: Reed and Eberlein, 1972; Bundtzen and Gilbert, 1983.

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| SO6.<br>62 53<br>152 08 | Boulder Creek (Purkeypile).<br>Sn | Sn greisen(?).<br>Tertiary granite | Estimated 136,000 kg Sn. Grab samples with up to 18% Sn, 7,900 g/t Ag |

DESCRIPTION: Disseminated cassiterite and sulfides in clusters of narrow open-space fracture fillings, suggestive of stockwork deposit. Deposit occurs in lime silicate rock, quartzite, and argillite approximately 100 to 200 m north of Tertiary biotite granite, part of the lower Tertiary McKinley sequence. SOURCES: Maloney and Thomas, 1966; Conwell, 1977; Reed and others, 1978; Warner, 1985.

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| SO7.<br>60 51<br>151 48 | Miss Molly (Hayes Glacier).<br>Mo | Porphyry Mo.<br>Tertiary(?) granite | Grab and chip samples with up to 0.38% Mo, 0.16% Zn |

DESCRIPTION: Quartz veins with medium- to coarse-grained molybdenite, pyrite, and local fluorite. Veins are regularly spaced, subparallel, vary from 2 to 10 cm wide, and are spaced 2 to 10 m apart. Veins occur in two zones about 545 m long and up to 150 m wide in leucocratic, equigranular biotite Tertiary(?) granite stock. Veins locally fill joints and less commonly shears. Hydrothermal alteration of sericite and pyrite, up to 0.3 m wide, occurs adjacent to veins. Granite stock intrudes siltstone, part of Upper Jurassic and Lower Cretaeous flysch. Nearby granitic plutons with K-Ar ages of 56 to 59 m.y. SOURCE: Fernette and Cleveland, 1984.

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| SO8.<br>63 04<br>149 57 | Partin Creek.<br>Cu, Au, Ag | Polymetallic vein or Cu-Ag quartz vein.<br>Triassic(?) metabasalt and limestone | Grab samples with up to 0.7% Cu, 63 g/t Au, 300 g/t Ag |

DESCRIPTION: Zone of pyrite, arsenopyrite, pyrrhotite, and chalcopyrite in veinlets, disseminations, or vesicle fillings. Zone at least 3,000 m long and 1,000 m wide in Triassic(?) metamorphosed pillow basalt and strongly limonite-stained marble. SOURCE: Hawley and Clark, 1974.

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| SO9.<br>63 00<br>149 51 | Coal Creek.<br>Sn, Ag, W, Zn | Sn greisen(?) and Sn vein.<br>Tertiary granite | Estimated 5 million tonnes grading 0.28% Sn and about 0.5% Cu. Grab samples with up to 1.5% Sn, 148 g/t Ag |

DESCRIPTION: Cassiterite in sporadic grains and locally high concentrations in sheeted vein system, and in minor disseminations within and above apical dome of early Tertiary granite intruding older, related granite, and in thin quartz topaz-sulfide veinlets, 1 to 3 mm wide, that postdate alteration and stockwork veinlets. Veins vary from hairline to 1 cm width, are nearly vertical, and reach a density of 10 veins per m in most intensely fractured zones. Veins form stockwork along fracture(?) zone in granite in area about

4,000 $m^2$. Veinlet sulfides include arsenopyrite, pyrite, pyrrhotite, and sphalerite. Granite adjacent to veinlets pervasively altered to quartz, tourmaline, topaz, sericite, and minor fluorite. Granite intrudes contact-metamorphosed Devonian argillite, graywacke, and minor limestone of Chulitna area. Granite probably part of the McKinley sequence with K-Ar ages of 55 m.y. SOURCES: Reed, 1977; Warner, 1985; Gregory Thurow, written commun., 1984.

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| SO10.<br>63 09<br>149 52 | Ready Cash.<br>Cu, Pb, Ag, Sn, Zn | Polymetallic vein(?).<br>Triassic(?) metabasalt | Chip sample with 1.4 g/t Au, 857 g/t Ag, 1.5% Cu, and 5% Pb |

DESCRIPTION: Zone of arsenopyrite, chalcopyrite, and galena in quartz-arsenopyrite-sulfide veins, massive sulfide veins, and disseminations. Zone at least 1.6 km long; occurs in Triassic(?) limestone and pillow basalt of Chulitna region. SOURCE: Hawley and Clark, 1974.

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| SO11.<br>63 13<br>149 38 | Golden Zone.<br>Au, Cu, Ag, Pb, Zn, As, Sb | Polymetallic vein and associated Au-Ag breccia pipe. Tertiary diorite porphyry | Average values up to 20.6 g/t Au. Up to 172 g/t Ag and 1% Cu. Produced 49,169 g Au, 267,990 g Ag, 19 tonnes Cu |

DESCRIPTION: Zone of disseminated to small masses of gold and arsenopyrite, and minor chalcopyrite, sphalerite, and pyrite in quartz gangue. Sulfides and quartz gangue fills open spaces of breccia pipe in center of early Tertiary quartz diorite porphyry, and fractures in porphyry adjacent to breccia pipe. Zone about 125 m in diameter; high-grade ore occurs in breccia pipe approximately 75 m in diameter at surface. Abundant veins adjacent to porphyry. Porphyry, dated at 68 m.y., intrudes Permian to Jurassic sedimentary rocks of Chulitna area. SOURCES: Hawley and Clark, 1974; Swainbank and others, 1977; Charles C. Hawley, written commun., 1985.

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| SO12.<br>63 17<br>149 27 | Nim and Nimbus (Silver King).<br>Au, Ag, Cu, Zn, Mo, As | Polymetallic vein.<br>Early Tertiary granitic porphyry and felsic dike | Nimbus: grab samples with up to 2% Cu, 137 g/t Ag, 13 g/t Au |

DESCRIPTION: Nim: Deposit of veins, veinlets, and disseminations of arsenopyrite, chalcopyrite, molybdenite, and chalcocite, with some pyrite, bornite, and pyrrhotite in breccia pipes and in dikes of rhyolite porphyry and quartz porphry within a body of granite porphyry. Igneous rocks intrude Triassic(?) and Jurassic(?) clastic sedimentary rocks. Deposit occurs in area about 1 km by 2 km. Nimbus (Silver King): Prospect composed of lens of massive arsenopyrite, pyrite, and sphalerite 1 to 2 m thick and 10 m long occurring in brecciated quartz diorite porphyry dike that occurs in strand of Upper Chulitna fault. SOURCES: Hawley and Clark, 1974; Swainbank and others, 1977; Richard C. Swainbank, written commun., 1985.

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| SO13.<br>63 11<br>149 55 | Ohio Creek<br>Sn, Ag, As | Sn greisen and Sn vein.<br>Tertiary granite stock | Grab samples with up to 0.1% Sn, and minor Ag, As, Cu, Zn |

DESCRIPTION: Zone of muscovite-tourmaline greisen and quartz arsenopyrite veins in tourmaline-bearing Tertiary granite stock. Zone about 1.6 km long and 0.8 km wide. Greisen zone about 4 m thick and 45 m long occurs along contact with biotite-rich inclusion. Stock part of the lower Tertiary McKinley sequence and intrudes argillite, graywacke, and conglomerate, part of Upper Jurassic(?), Cretaceous, and lower Tertiary(?) flysch in region. SOURCE: Hawley and Clark, 1974.

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| SO14.<br>62 53<br>149 18 | Treasure Creek.<br>Mo, Cu, Au, Zn | Porphyry Cu-Mo.<br>Tertiary quartz monzonite | No data |

DESCRIPTION: Disseminated molybdenite, chalcopyrite, arsenopyrite, sphalerite, fluorite, and epidote in silicified and sheared Tertiary granite stock, and in bordering argillite and metagraywacke intruded by granite. Local intense argillic alteration and limonite staining adjacent to fault, extending irregularly up to 100 m into granite stock. Argillite and metagraywacke part of extensive Lower Cretaceous flysch in region. Granite stock part of the lower Tertiary McKinley sequence. SOURCES: Richter, 1963; Csejtey and Miller, 1978.

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## BASALTIC Cu, Cu-Ag QUARTZ AND POLYMETALLIC VEIN, Cu-Au-Ag SKARN, Fe SKARN, BESSHI MASSIVE SULFIDE, PORPHYRY Cu AND Cu-Mo, AND DUNITIC Ni-Cu DEPOSITS, CENTRAL AND EASTERN ALASKA RANGE AND WRANGELL MOUNTAINS

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| SO15.<br>63 09<br>147 08 | Denali (Pass Creek).<br>Cu, Ag | Besshi massive sulfide(?). Upper Triassic argillite | Massive sulfide layers with abundant Cu and up to 13 g/t Ag |

DESCRIPTION: Stratiform masses and bodies of very fine grained and thin-layered chalcopyrite and pyrite in thin-bedded, shaly, carbonaceous, and limy argillite enclosed in the Upper Triassic Nikolai Greenstone. Zone up to 166 m long and 9 m wide. Zone extends at least 212 m below surface. Rhythmic layering of sulfides. Locally moderately folded. Sulfides and host rocks metamorphosed at lower greenschist facies. Several hundred meters of underground workings. Mine developed from 1964 to 1969. Interpreted to have formed in reducing or euxinic marine basin created by abundant organic matter and sulfate reducing bacteria, in a submarine volcanic environment. SOURCES: Stevens, 1971; Seraphim, 1975; Smith, 1981.

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| SO16.<br>63 13<br>146 42 | Zackly.<br>Au, Cu, Ag | Cu-Au skarn.<br>Cretaceous quartz monzodiorite | Grab samples with up to 6.6% Cu, 4.4 g/t Au, 30 g/t Ag. Estimated 1.25 million million tonnes grading 2.6% Cu and >6 g/t Au |

DESCRIPTION: Disseminated chalcopyrite, bornite, pyrite, and gold in zone of andradite garnet-pyroxene skarn and adjacent sulfide bodies in marble. Hosted in Upper Triassic marble along east-west-striking contact adjacent to albitized Cretaceous quartz monzodiorite. Zone about 650 m long and about 30 m wide. Marble and diorite locally intensely faulted. Higher Au grades mainly associated with supergene(?) assemblage of malachite, limonite, chalcedony, and native copper. Gold occurs only in skarn; granitic pluton and wallrocks barren of gold. General zoning from granitic pluton to skarn with (1) brown garnet with chalcopyrite, (2) green garnet with bornite and chalcopyrite, (3) clinopyroxene and wollastonite, to marble with magnetite and bornite. SOURCES: Rose, 1965b; Ian M. Lange and Warren J. Nokleberg, written commun., 1984; Nokleberg and others, 1984; Rainier Newberry, written commun., 1985; Clint R. Nauman, written commun., 1985.

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| SO17.<br>63 17<br>146 33 | Kathleen-Margaret.<br>Cu, Ag, Au | Cu-Ag quartz vein.<br>Upper Triassic Nikolai Greenstone | Grab samples with up to 13% Cu, 3.2 g/t Au, 300 g/t Ag, and 0.07% Sn. About 1.8 tonnes ore produced |

DESCRIPTION: Quartz veins up to 140 m long and 3 m wide with disseminated to locally massive chalcopyrite, bornite, and malachite. East-west striking vein system. Veins intruded along shear zones in the Upper Triassic Nikolai Greenstone. SOURCES: MacKevett, 1965; Nokleberg and others, 1984.

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| SO18.<br>63 20<br>146 02 | Rainy Creek<br>District.<br>Cu, Ag, Au | Cu-Ag skarn.<br>Upper Paleozoic<br>marble | Grab samples with up to<br>5.6% Cu, 300 g/t Ag, 1.2 g/t<br>Au, 0.07% Zn |

DESCRIPTION: Zone of disseminated to small masses of chalcopyrite, bornite, and minor sphalerite, galena, magnetite, secondary Cu-minerals, and sparse gold in several localities of garnet-pyroxene skarn. Deposits occur in faulted lenses of marble of the Pennsylvanian and Permian Slana Spur Formation adjacent to late Paleozoic(?) metagabbro, metadiabase, and meta-andesite hypabyssal intrusive rocks. Local disseminated sulfides in metaandesite. Zone of skarns up to about 10 km long and up to 5 km wide. Sulfide zones and adjacent wallrocks locally intensely faulted. SOURCES: Rose, 1966; Lange and others, 1981; Nokleberg and others, 1984; Ian M. Lange and Warren J. Nokleberg, written commun., 1984.

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| SO19.<br>63 20<br>145 41 | Rainbow Mountain.<br>Cu, Ag | Porphyry Cu. Upper<br>Paleozoic meta-andesite<br>to metadacite porphy-<br>ries | Grab samples with up to<br>10% Cu, 44 g/t Ag, trace Au |

DESCRIPTION: Zone of disseminated to small masses of chalcopyrite and pyrite, and minor sphalerite and galena in Permian meta-andesite and metadacite hypabyssal subvolcanic porphyries. Zone up to 6 km long along strike and up to 1 km wide. Local disseminated sulfides in adjacent metavolcanic and metasedimentary rocks. SOURCES: Lange and others, 1981; Nokleberg and others, 1984; Ian M. Lange and Warren J. Nokleberg, written commun., 1985.

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| SO20.<br>63 13<br>146 48 | Fish Lake.<br>Cr, Ni | (Dunitic Ni-Cu).<br>Upper Triassic<br>ultramafic rocks | Grab samples with >0.5% Cr<br>and 0.3% Ni |

DESCRIPTION: Strike zone with disseminated chromite and wispy layers in serpentinized olivine cumulate. Zone up to 15 km long along strike and up to 2 km wide. Local anomalous Cu and Ni in stream-sediment and rock samples. Olivine cumulate interpreted as comagmatic with mafic magmas forming metamorphosed basalt in the Upper Triassic Nikolai Greenstone. SOURCES: Nokleberg and others, 1984; Ian M. Lange and Warren J. Nokleberg, written commun., 1985.

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| SO21.<br>63 09<br>144 48 | Slate Creek.<br>Cu, Ag, Au, Zn | Porphyry Cu(?). Late<br>Permian(?) meta-ande-<br>site to metadacite<br>porphyries | Grab samples with up to<br>2% Cu, 70 g/t Ag, 2 g/t Au |

DESCRIPTION: Zone of disseminated to small masses of chalcopyrite and pyrite, and minor sphalerite and galena in Permian(?) meta-andesite to metadacite hypabyssal porphyries. Zone about 2 km wide and up to 9 km long along strike. Local disseminated sulfides in adjacent metavolcanic and metasedimentary rocks of the Pennsylvanian and Permian Slana Spur Formation. SOURCES: Lange and others, 1981; Ian M. Lange and Warren J. Nokleberg, written commun., 1984; Nokleberg and others, 1984.

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| SO22.<br>62 49<br>144 10 | Chistochina<br>District.<br>Pb, Cu, Ag, Au | Porphyry Cu and poly-<br>metallic vein. Late<br>Paleozoic Ahtell pluton | Grab samples with up to 20%<br>Pb, 1.4% Cu, 21 g/t Ag, 1.4<br>g/t Au |

DESCRIPTION: Several areas with galena, pyrite, chalcopyrite, tetrahedrite, or gold in quartz veins, small masses, and (or) disseminations in margins of the quartz diorite Pennsylvanian and Permian Ahtell pluton and in adjacent volcanic and sedimentary rocks of the Pennsylvanian and Permian Slana Spur Formation. Quartz veins up to 10 m wide and locally with massive barite, calcite, and cerussite. Zone of occurrences about 5 km long and 3 km wide. Local small Cu-Au and Pb-Zn skarns. SOURCES: Richter, 1966; Rainier J. Newberry, written commun., 1985.

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| SO23.<br>62 23<br>143 00 | Nabesna, Rambler.<br>Au | Fe skarn. Upper Triassic Chitistone or Nizina Limestone | Produced about 1.66 million g Au, minor Ag and Cu (Nabesna mine). Estimated 18,000 tonnes grading 34.3 g/t Au (Rambler mine) |

DESCRIPTION: Nabesna Mine: massive oxide-sulfide bodies, quartz-pyrite veins, and pyrite veins all with disseminated gold in Upper Triassic limestone near contact with Cretaceous monzodiorite pluton. Massive oxide-sulfide bodies chiefly pyrite and magnetite with minor chalcopyrite, galena, sphalerite, arsenopyrite, stibnite, and gold. Pyrite veins formed by replacement of limestone along pre-existing fractures; contain disseminated to small masses of chalcopyrite, galena, sphalerite, magnetite, pyrrhotite, arsenopyrite, stibnite, and gold. Major body of massive auriferous pyrrhotite and pyrite at Rambler Mine. Monzodiorite pluton has K-Ar ages of 109 and 114 m.y. Principal mining at Nabesna from about 1930 to 1941. Several hundred meters of workings. SOURCES: Wayland, 1943; Richter and others, 1975; Donald H. Richter, written commun., 1985; Rainer Newberry, written commun., 1985.

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| SO24.<br>62 12<br>142 45 | Orange Hill, Bond Creek.<br>Cu, Mo | Porphyry Cu-Mo and Cu-Au skarn. Cretaceous Nabesna pluton | Estimated 320 million tonnes grading 0.35% Cu and 0.02% Mo (Orange Hill). 500 million tonnes grading 0.30% Cu and 0.02% Mo (Bond Creek) |

DESCRIPTION: Two areas with pyrite, chalcopyrite, and minor molybdenite in quartz veinlets in the Cretaceous Nabesna pluton, a complex intrusion of granodiorite and quartz diorite intruded by granite porphyry. Abundant biotite-quartz, quartz sericite, and chlorite-sericite-epidote alteration. Late anhydrite veins. Altered areas of 1,000 by 3,000 m for Orange Hill and 2,000 by 3,000 m for Bond Creek. Associated skarns with pyrite, chalcopyrite, bornite, and magnetite (Orange Hill), and sphalerite, pyrite, pyrrhotite, and chalcopyrite in adjacent areas. Plutons intrude upper Paleozoic metavolcanic rocks and marble, and the Upper Triassic limestone and Nikolai Greenstone. SOURCES: Van Alstine and Black, 1946; Richter and others, 1975.

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| SO25.<br>62 07<br>142 50 | Nabesna Glacier and adjacent areas.<br>Cu, Zn, Au | Polymetallic vein(?). Late Paleozoic Tetelna Volcanics | No data. |

DESCRIPTION: Three adjacent areas with: (1) quartz veins and veinlets with pyrite and minor chalcopyrite and sphalerite; (2) a zone of disseminated malachite and azurite; (3) a zone of intense alteration with breccia cemented by quartz, pyrite, chalcopyrite, and galena. Deposits occur in late Paleozoic metavolcanic porphyry and metabasalt flows of the Tetelna Volcanics; may be related to nearby Cretaceous and Tertiary granitic plutons and dikes. SOURCE: Richter and others, 1975.

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| SO26.<br>62 05<br>141 13 | Baultoff, Horsfeld, Carl Creek.<br>Cu, Mo | Porphyry Cu. Cretaceous Klein Creek batholith | Estimated 240 million tonnes grading 0.2% Cu and <0.01% Mo. Trace Au |

DESCRIPTION: Three separate areas with pyrite and chalcopyrite in veinlets and disseminations in altered Cretaceous granitic plutons. Plutons composed of quartz diorite, quartz diorite porphyry, or granite porphyry. Altered areas up to 1,000 by 2,000 m with chlorite, sericite, albite, and pyrite. Local actinolite veins and disseminations. Host rocks part of the Cretaceous Klein Creek batholith and associated granitic rocks. Intrude Upper Jurassic and Lower Cretaceous flysch of Gravina-Nutzotin belt. SOURCE: Richter and others, 1975.

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| SO27.<br>61 33<br>143 47 | Midas (Berg Creek).<br>Au, Cu, Ag | Cu-Au skarn.<br>Triassic Nizina Limestone | Grab samples with up to 8 g/t Au, 10 g/t Ag, and 20% Cu |

DESCRIPTION: Disseminated to small masses of magnetite, pyrite, and chalcopyrite in quartz veins and skarns hosted in metamorphosed limestone adjacent to Jurassic granodiorite to quartz monzodiorite pluton. Skarn composed of magnetite and epidote with local pyrite, chalcopyrite, and gold. Two short adits. SOURCE: MacKevett, 1976.

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| SO28.<br>61 34<br>143 43 | London and Cape.<br>Cu, Mo, Ag | Porphyry Cu-Mo.<br>Jurassic(?) granodiorite and quartz diorite | Grab samples with up to 10% Cu, 0.007% Mo, 1.5 g/t Ag. Average grade of 0.1% Cu |

DESCRIPTION: Pyrite and chalcopyrite in veinlets and disseminations in locally altered Jurassic(?) granodiorite and quartz diorite. Small adit. Granitic rocks intrude Lower Cretaceous sedimentary rocks. SOURCES: Moffitt and Mertie, 1923; MacKevett, 1976.

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| SO29.<br>61 39<br>143 43 | Nugget Creek.<br>Cu, Ag | Cu-Ag quartz vein.<br>Middle and (or) Upper Triassic Nikolai Greenstone | Grab sample with >200 g/t Ag, and >2% Cu. Produced 145 tonnes ore and concentrate |

DESCRIPTION: Quartz vein more than 1 m thick with bornite, chalcopyrite, and pyrite. Vein occurs along fault in the Nikolai Greenstone. Slablike copper nugget of several tonnes in float in Nugget Creek. Development and production from 1916 to 1919. More than 1,200 m workings. Lower grades at depth. SOURCE: MacKevett, 1976.

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| SO30.<br>61 31<br>142 50 | Kennecott District.<br>Cu, Ag | Basaltic Cu. Upper Triassic Chitistone or Nizina Limestone | Produced about 544 million kg Cu and 280 million g Ag from 4.3 million tonnes ore |

DESCRIPTION: Mainly chalcocite and covellite, with lesser enargite, bornite, chalcopyrite, luzonite, and pyrite. Tennantite, sphalerite, and galena extremely rare. Local secondary malachite and azurite also occur. Sulfides occur in mainly irregular massive bodies, mainly in dolomitic parts of the Upper Triassic Chitistone or Nizina Limestone, and generally less than 100 m above the underlying Middle and (or) Upper Triassic Nikolai Greenstone. Largest ore body (Jumbo) about 110 m high, up to 18.5 m wide, and extended 460 m along plunge. Main production from 1913 to 1938. More than 96 km of underground workings. Major mines in district are Jumbo, Bonanza, Erie, Mother Lode, and Green Butte. Deposits interpreted by Armstrong and MacKevett (1982) as having formed through derivation of Cu from the underlying Nikolai Greenstone and deposited by oxygenated groundwater in dolomitic sabkha interface in open-space fillngs in fossil karsts in overlying limestone. Age of deposition interpreted as Late Triassic with possible subsequent remobilization. SOURCES: Bateman and McLaughlin, 1920; MacKevett, 1976; Armstrong and MacKevett, 1982; Edward M. MacKevett, Jr., written commun., 1986.

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| SO31.<br>62 28<br>142 41 | Nikolai.<br>Cu, Ag | Cu-Ag quartz vein.<br>Middle and (or) Upper Triassic Nikolai Greenstone | Grab sample with 1% Cu |

DESCRIPTION: Two quartz veins, each less than 1 m thick, with bornite, chalcopyrite, bornite, pyrrhotite, and secondary copper, and iron minerals. Quartz-calcite gangue. Veins in shear zone near top of the Middle and (or) Upper Triassic Nikolai Greenstone. Deposit known to natives in late 1800's. More than 100 m of underground workings. Developed in 1899. SOURCES: Moffit and Capps, 1911; Miller, 1946; MacKevett and Smith, 1968.

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| SO32.<br>61 24<br>142 30 | Westover.<br>Cu, Ag | Basaltic Cu. Upper Triassic Chitistone Limestone | Channel samples with abundant Cu, 50 g/t Ag, 0.2% As. Grab sample with >2% Cu, 50 g/t Ag, 0.2% As |

DESCRIPTION: Wedge-shaped pods and fissures of disseminated to massive bornite-rich lenses with minor chalcocite, malachite, and chalcopyrite in lower part of the Upper Triassic Chitistone Limestone. Largest pod 10 m long and 3 m wide. Limestone locally silicified near ore. More than 400 m of underground workings. Development and minor production from 1911 to 1920. Similar to Kennecott deposit. SOURCES: Moffit and Capps, 1911; Moffit, 1918; Miller, 1946; MacKevett and Smith, 1968; MacKevett, 1976.

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| SO33.<br>61 27<br>142 23 | Nelson (Glacier Creek).<br>Cu, Ag | Basaltic Cu. Upper Triassic Chitistone Limestone | Abundant Cu; grab samples with >2% Cu, 50 g/t Ag, 0.3% As |

DESCRIPTION: Stringers and discontinuous masses of disseminated to massive chalcocite and covellite with minor enargite, bornite, malachite, chalcopyrite, native copper, and pyrite in basal parts of fault block of the Upper Triassic Chitistone Limestone. Local faulting and shearing. A few hundred meters of underground workings. Minor production from 1929 to 1930. Several pits and five short adits. Similar to Kennecott deposit. SOURCES: Miller, 1946; Sainsbury, 1951; MacKevett and Smith, 1968; MacKevett, 1976.

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| SO34.<br>61 25<br>142 15 | Erickson.<br>Cu, Ag | Basaltic Cu. Middle and (or) Upper Triassic Nikolai Greenstone | Grab samples with >2% Cu, 70 g/t Ag |

DESCRIPTION: Massive to disseminated native copper, tenorite, cuprite, and minor amounts of other Cu minerals in irregular masses, thin veins, and stringers in rubbly upper parts of flows, and to lesser extent, in amygdules and quartz-epidote veins in the Middle and (or) Upper Triassic Nikolai Greenstone. Most of copper fine-grained; masses to 27 kg. Minor production in 1917. About 100 m of underground workings. SOURCES: Miller, 1946; MacKevett and Smith, 1968; MacKevett, 1976.

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## Au QUARTZ VEIN, PODIFORM CHROMITE, AND GABBROIC Ni-Cu DEPOSITS, TALKEETNA MOUNTAINS, KODIAK ISLAND, NORTHWESTERN KENAI PENINSULA, AND NORTHERN CHUGACH MOUNTAINS

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| SO35.<br>61 45<br>149 30 | Willow Creek District (Gold Cord, Independence, Thope and others<br>Au | Polymetallic vein. Jurassic, Cretaceous, and early Tertiary granitic rocks | Produced about 18.4 million g Au from 1909 to 1950. Average grades from about 17 to 69 g/t Au |

DESCRIPTION: Quartz veins with pyrite, chalcopyrite, magnetite, and gold, and minor arsenopyrite, sphalerite, tetrahedrite, and galena. Veins average 0.3 to 1 m thick, locally up to 2 m thick. Veins occupy east-northeast and north-south-striking shear zones up to 7 m wide. Considerable alteration of wall rocks to sericite, pyrite, carbonate, and chlorite. Local abundant clay-rich fault gouge along shear zones. Zone of veins hosted in and along southern margin of Jurassic quartz diorite and younger Cretaceous and early Tertiary granitic rocks of the Talkeetna Mountains batholith, and in mica schist in Thorpe mine. Several mines and many prospects, mainly in area about 12.8 km long and 6.2 km wide along southern margin of batholith. Total of several thousand meters of underground workings. Nearly continuous mining and development from 1909 through 1942; sporadic activity from 1951 through present. SOURCE: Ray, 1954.

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| SO36.<br>57 22<br>154 36 | Halibut Bay.<br>Cr | Podiform chromite.<br>Early Jurassic or older dunite tectonite | Eight low-grade deposits with estimated 180,000 tonnes $Cr_2O_3$ |

DESCRIPTION: Sparse layers and lenses of chromite in dunite and sparse clinopyroxenite tectonite in areas up to 300 m long and about 100 m wide. Ultramafic rocks part of the Early Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985), faulted at base. SOURCES: Foley and Barker, 1984; Burns, 1985.

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| SO37.<br>59 12<br>151 49 | Claim Point.<br>Cr | Podiform chromite.<br>Early Jurassic or older dunite tectonite | Estimated 82,000 tonnes $Cr_2O_3$. Produced 2,000 tonnes |

DESCRIPTION: Layers and lenses of chromite up to 60 m long and 14 m wide in dunite tectonite in area about 500 by 500 m. About 14 separate deposits. Hosted in Early Jurassic or older layered dunite tectonite. Sparse olivine-pyroxene dikes. Local abundant serpentinite. Ultramafic rocks part of Early Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985), faulted at base. Explored and developed from about 1909 to 1919. Mining from 1917 to 1918. Several hundred meters of underground workings and trenches. SOURCES: Guild, 1942; Burns, 1985; Foley and Barker, 1985.

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| SO38.<br>59 22<br>151 30 | Red Mountain.<br>Cr | Podiform chromite.<br>Early Jurassic or older dunite tectonite | For two major deposits estimated 87,000 tonnes grading about 25 to 43% $Cr_2O_3$. One additional low-grade deposit with 1.13 million tonnes $Cr_2O_3$. |

DESCRIPTION: Layers and lenses of chromite up to a few hundred meters long and 60 m wide in dunite tectonite in areas up to several hundred meters long. Major chromite layer about 190 m long and up to 0.3 m wide. More than 10 smaller ore bodies. Hosted in Early Jurassic or older layered dunite tectonite with minor pyroxenite in zones about 60 m thick. Local abundant serpentinite. Ultramafic rocks part of the Early Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985), faulted at base. Sporadic exploration and development from about 1919 to present. Several hundred meters of underground workings and trenches. About 26,000 tonnes ranging from 38 to 42% $Cr_2O_3$ produced from 1943 to 1957. Downstream of Red Mountain is nearby Windy River chromite placer deposit in glaciofluvial sand and gravel deposits with estimated 15.6 million cu m grading 1.33% $Cr_2O_3$. SOURCES: Guild, 1942; Bundtzen, 1983b; Burns, 1985; Foley and Barker, 1985; Foley and others, 1985..

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| SO39.<br>61 32<br>145 09 | Bernard Mountain, Dust Mountain.<br>Cr, PGE | Podiform chromite.<br>Early Jurassic or older dunite tectonite | Four large low-grade deposits with 330,000 tonnes $Cr_2O_3$ |

DESCRIPTION: Disseminations and sparse layers and lenses of chromite up to a few tens of meters long and 15 m wide in dunite tectonite. Largest chromite occurrence about 3.5 km long and 2.0 km wide, contains about 300,000 tonnes $Cr_2O_3$ grading 5% chromite. Sample of high-Fe chromian spinel from Dust Mountain contains up to 21 g/t PGE. Hosted in Early Jurassic or older layered dunite tectonite. Local abundant serpentinite. Structural sequence from south to north composed of dunite, harzburgite, wehrlite, garnet gabbro, norite, and hornblende norite. Ultramafic rocks part of the Early Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985), faulted at base. Sporadic exploration and trenching from about 1940 to present. SOURCES: Foley and others, 1984; Coleman and Burns, 1985; Burns, 1985; Newberry, 1986.

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| SO40.<br>61 18<br>144 16 | Spirit Mountain.<br>Ni, Cu | Gabbroic Ni-Cu(?).<br>Jurassic or older mafic and ultramafic rocks | Estimated 5,900 tonnes grading 0.22 to 0.88% Ni and 0.12 to 0.89% Cu. Up to 68.6 g/t Ag |

DESCRIPTION: Pyrrhotite, pyrite, pentlandite, chalcopyrite, and minor bravoite and sphalerite in small massive sulfide lenses and disseminations in serpentinized peridotite and pyroxenite. Ultramafic rocks associated with gabbroic sills intruding upper Paleozoic limestones and older rocks. Ultramafic and mafic rocks may be part of the Early Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985), faulted at base. SOURCES: Kingston and Miller, 1945; Herreid, 1970.

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## Au QUARTZ VEIN DEPOSITS, KODIAK ISLAND, SOUTHEASTERN KENAI PENINSULA, AND SOUTHERN CHUGACH MOUNTAINS

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| SO41.<br>57 48<br>152 20 | Chalet Mountain (Cornelius Creek).<br>W, Au, Ag | Au quartz vein. Late Cretaceous metagraywacke and granodiorite | Grab samples with up to 1.75% $WO_3$, 9.6 g/t Au, 120 g/t Ag |

DESCRIPTION: Silicified zones and quartz veins with disseminated scheelite and gold(?). Zones and veins occur within a 100 by 500 m area of silicified metagraywacke of the Upper Cretaceous Kodiak Formation at Chalet Mountain, and in nearby granodiorite pluton at Anton Larsen Bay. Scheelite in silicified zones localized in calcareous-rich part of metagraywacke. SOURCES: Seitz, 1963; Rose and Richter, 1967.

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| SO42.<br>59 33<br>150 35 | Nuka Bay District (Nualaska, Lost Creek, Alaska Hills). Au | Au quartz vein. Upper Cretaceous metagraywacke and phyllite | Produced about 258,000 g Au; channel samples range from 1 to 300 g/t Au |

DESCRIPTION: Quartz veins up to 1.0 m wide and 100 m long with gold, arsenopyrite, pyrite, chalcopyrite, and galena. Irregular shape with local pinch and swell. Veins generally strike east-west, normal to regional structure. Veins mainly fissure fillings in metagraywacke and to lesser extent in phyllite of the Upper Cretaceous Valdez Group. Veins probably fill tensional cross joints formed during late stages of regional folding of host rocks. Sparse Tertiary quartz diorite dikes cut by quartz veins. Several mines and prospects. About 1,300 m underground workings. Explored and developed from about 1909 to 1940. Sparse subsequent mining. SOURCE: Richter, 1970.

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| SO43.<br>60 37<br>149 34 | Alaska Oracle, Gilpatrick.<br>Au | Au quartz vein. Upper Cretaceous metagraywacke and phyllite | Produced about 106,000 g Au. Estimated 1,800 tonnes ore |

DESCRIPTION: Quartz veins up to 2 m thick with gold, arsenopyrite, galena, and sphalerite, and some chalcopyrite, molybdenite, and pyrrhotite. Veins in fault zones mainly in phyllite of the Upper Cretaceous Valdez Group. Wallrocks locally altered near veins. Highest grade ore in veins in altered areas. Extensive development; over 200 m of underground workings. Production mainly about 1933 to 1940. SOURCES: Tuck, 1933; Tysdal, 1978; Jansons and others, 1984.

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| SO44.<br>60 46<br>149 33 | Lucky Strike (Palmer Creek).<br>Au, Cu, Pb, Ag | Au quartz vein. Upper Cretaceous phyllite | Grab sample with 7 g/t Ag and 0.15% Pb. Produced about 172,450 g Au. Estimated 1,800 tonnes ore |

DESCRIPTION: Quartz vein up to 1.7 m thick with gold, pyrite, chalcopyrite, sphalerite, and galena in brecciated and fractured phyllite of the Upper Cretaceous Valdez Group. Fractures normal to cleavage. Extensive development; production mainly between 1916 and 1940. SOURCES: Tysdal, 1978; Jansons and others, 1984.

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| SO45.<br>60 27<br>149 18 | Crown-Point,<br>Kenai-Alaska.<br>Au | Au quartz vein. Upper Cretaceous metagray-wacke and phyllite | Produced about 97,200 g Au. Estimated 13,600 tonnes ore |

DESCRIPTION: Shear zone up to 900 m long and 12 cm wide filled with brecciated phyllite cemented by vuggy quartz with gold, arsenopyrite, galena, sphalerite, and calcite in phyllite of the Upper Cretaceous Valdez Group. Local quartz lenses and stringers up to 0.75 m wide. Extensive development mainly from about 1909 to 1940; over 500 m of underground workings. SOURCES: Martin and others, 1915; Tysdal, 1978; Jansons and others, 1984.

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| SO46.<br>61 05<br>149 06 | Monarch, Jewel.<br>Au | Au quartz vein. Upper Cretaceous metagray-wacke and phyllite | Produced about 154,000 g Au. Average of chip samples about 10.6 to 36.7 g/t Au and 10.6 g/t Ag |

DESCRIPTION: Two or more quartz veins up to 0.3 m long with calcite, galena, chalcopyrite, sphalerite, arsenopyrite, molybdenite, gold, and silver in metagraywacke and phyllite of the Upper Cretaceous Valdez Group. Local Tertiary felsic dikes and granodiorite. Over 380 m of underground workings. SOURCES: Johnson, 1915; Jansons and others, 1984.

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| SO47.<br>60 57<br>148 21 | Mineral King (Herman and Eaton).<br>Au | Au quartz vein. Upper Cretaceous metagray-wacke and phyllite | Produced about 87,000 g Au. Grab samples with up to 5.1 g/t Au and 4.5 g/t Ag. Estimated 450 tonnes ore |

DESCRIPTION: Quartz vein up to 2 m wide in lenses up to 22 m long with calcite, sphalerite, pyrite, galena, chalcopyrite, gold, pyrrhotite, and arsenopyrite in metagraywacke and phyllite of the Upper Cretaceous Valdez Group and in Tertiary granite. About 450 m of underground workings. SOURCES: Tysdal, 1978; Jansons and others, 1984.

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| SO48.<br>60 58<br>148 13 | Granite.<br>Au | Au quartz vein. Upper Cretaceous metagray-wacke and phyllite | Produced about 776,000 g Au. Estimated 1,700 tonnes ore |

DESCRIPTION: Fissure up to 4 m wide with brecciated phyllite and metagraywacke cemented by quartz with gold, pyrite, arsenopyrite, chalcopyrite, galena, stibnite, and sphalerite in the Upper Cretaceous Valdez Group and in Tertiary granite. Extensive development from about 1914 to about 1940. SOURCES: Tysdal, 1978; Jansons and others, 1984.

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| SO49.<br>61 12<br>146 44 | Gold King.<br>Au | Au quartz vein. Upper Cretaceous metagray-wacke | Produced about 62,000 g Au. Chip samples with up to 3.4 g/t Au and 1.3 g/t Ag |

DESCRIPTION: Two or more quartz fissure veins up 1.5 m thick with gold, pyrite, galena, sphalerite, chalcopyrite, and stibnite in mainly metagraywacke of the Upper Cretaceous Valdez Group. Sulfides compose about 3% of ore. Mineralized vein cuts small granite pluton. Graywacke locally shattered and sheared near veins. About 600 m of underground workings. Production principally between 1911 to 1924. SOURCES: Johnson, 1915; Jansons and others, 1984.

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| SO50.<br>61 07<br>146 33 | Cliff (Port Valdez).<br>Au | Au quartz vein. Upper Cretaceous metagray-wacke and phyllite | Average grade from 34 to to 69 g/t Au. Produced about 1,610,000 g Au |

DESCRIPTION: Quartz veins up to 3 m thick and 515 m long with gold, pyrite, galena, sphalerite, arsenopyrite, and stibnite in metagraywacke and minor phyllite of the Upper Cretaceous Valdez Group. Veins in complicated system of intersecting faults. Sulfides compose about 3 to 5% percent or ore. A few thousand meters of underground workings. Production mainly from 1906 to 1940. SOURCES: Johnson, 1915; Jansons and others, 1984.

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| SO51.<br>61 12<br>146 06 | Ramsay-Rutherford.<br>Au | Au quartz vein. Upper Cretaceous metagray-wacke | Produced about 172,000 g Au. Grab samples with up to 28 g/t Au |

DESCRIPTION: Two main quartz fissure veins up to 2 m thick and 136 m long with gold, silver, pyrrhotite, pyrite, chalcopyrite, sphalerite, galena, and arsenopyrite(?) in metagraywacke of the Upper Cretaceous Valdez Group. Gangue of quartz, carbonates, and crushed country rock. More than 450 m of underground workings. Mined from about 1914 to 1935. SOURCES: Johnson, 1915; Jansons and others, 1984.

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## BESSHI AND CYPRUS MASSIVE SULFIDE DEPOSITS, PRINCE WILLIAM SOUND DISTRICT, CHUGACH MOUNTAINS

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| SO52.<br>61 01<br>146 16 | Midas.<br>Cu, Ag, Au, Zn | Besshi massive sulfide(?). Upper Cretaceous phyllite, graywacke, and greenstone | Average grades of about 3.2% Cu, 13.7 g/t Ag, 2.1 g/t Au. Produced 1.54 million kg Cu, 471,000 g Ag, 79,000 g Au. Estimated 56,200 tonnes ore grading 1.6% Cu remain |

DESCRIPTION: Disseminated to massive stratiform chalcopyrite, pyrite, pyrrhotite, sphalerite, and minor galena in ore body up to 7 m thick and 300 m long. Sulfide layering and folding parallels beds and folds in host sedimentary rocks. Weak to unmineralized quartz stockwork in footwall may be feeder system for main ore body. Ore bodies in phyllite and metagraywacke of the Upper Cretaceous Valdez Group. Extensive underground workings with production between 1911 and 1919. Estimated 44,800 tonnes ore mined. Earlier workers interpreted deposit as epigenetic replacement in shear zones. SOURCES: Johnson, 1915; Moffit and Fellows, 1950; Rose, 1965b; Winkler and others, 1981; Jansons and others, 1984; Steven W. Nelson, written commun., 1986.

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| SO53.<br>63 02<br>147 51 | Latouche, Beatson.<br>Cu, Ag, Au, Pb, Zn | Besshi massive sulfide(?). Lower Tertiary argillite and graywacke | Produced more than 84.4 million kg Cu from 4.5 million tonnes ore. Average grade about 1.7% Cu, 9.3 g/t Ag |

DESCRIPTION: Two major deposits and several smaller ones consisting of a zone of massive sulfide lenses and disseminations composed mainly of pyrite and pyrrhotite with minor chalcopyrite, cubanite, sphalerite, galena, silver, and gold. Gangue of quartz, sericite, and ankerite. Zone adjacent to major fault in graywacke and argillite of the lower Tertiary Orca Group. Zone up to 120 m thick and 300 long along strike. Developed and produced mainly from about 1903 to 1934. SOURCES: Johnson, 1915; Tysdal, 1978; Jansons and others, 1984.

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| SO54.<br>60 20<br>147 42 | Knight Island, Pandora.<br>Cu | Cyprus massive sulfide. Lower Tertiary pillow basalt | Produced up to a few thousand tonnes ore |

DESCRIPTION: Two major deposits and several smaller deposits with pyrite, pyrrhotite, chalcopyrite, cubanite, sphalerite, and quartz in massive sulfide lenses and disseminations. Lenses up to 9 m thick, average 1.5 m thick. Lenses mainly at sheared contacts with host rocks. Deposits occur in pillow basalt of the lower Tertiary Orca Group. A few hundred meters of underground workings. Minor production. SOURCES: Moffit and Fellows, 1950; Tysdal, 1978; Jansons and others, 1984.

## SIGNIFICANT METALLIFEROUS LODE DEPOSITS, SOUTHEASTERN ALASKA

By Henry C. Berg, David A. Brew, and Warren J. Nokleberg, with contributions from J. Dunbier, Donald Grybeck, D. Scherkenbach, P. R. Smith, and J. E. Stephens

| MAP NUMBER. LATITUDE LONGITUDE | NAME. COMMODITIES | TYPE. GEOLOGIC HOST UNIT | TONNAGE AND GRADE. PRODUCTION, IF KNOWN |
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| **METAMORPHOSED SULFIDE, BESSHI MASSIVE SULFIDE, POLYMETALLIC AND Au QUARTZ VEIN, Fe SKARN, PORPHYRY Mo, AND ZONED MAFIC-ULTRAMAFIC DEPOSITS, COAST MOUNTAINS REGION** | | | |
| SE1.<br>58 50<br>135 03 | Jualin.<br>Au, Cu, Pb, Zn | Au quartz vein.<br>Cretaceous quartz diorite | Average grade of 17.2 g/t Au. 51.5 g/t Au in one vein. Produced about 1.5 million g Au |

DESCRIPTION: Four or five major quartz fissure veins and pipelike stockwork with minor gold, and considerable pyrite, chalcopyrite, galena, minor sphalerite, and secondary copper minerals in Cretaceous quartz diorite. Pyrite is dominant sulfide. Gold associated with pyrite as minute blebs in goethite rims and fracture fillings in corroded crystals. Gangue of quartz with lesser ankerite, chlorite, and sericite. Quartz diorite adjacent to veins exibit proximal ankerite, quartz, and sericite alteration, and more widespread propylitic alteration. Quartz diorite intrudes Upper Triassic greenstone, graywacke, and argillite of Alexander belt. More than 5,500 m of horizontal workings. Principal mining from 1895 to 1920. SOURCES: Knopf, 1911; Jones and others, 1984a.

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| SE2.<br>58 52<br>135 05 | Kensington.<br>Au, Ag, Pb | Au quartz vein.<br>Cretaceous quartz diorite | Produced 10,900 tonnes grading about 5.8 g/t Au. Esti- 450,000 tonnes of similar grade remaining |

DESCRIPTION: Stockworks of quartz veins in high-angle zones of sheared and chloritized Cretaceous quartz diorite. Veins contain mainly pyrite with some chalcopyrite and rare galena. Pyrite varies from disseminated euhedral crystals to massive veins up to 0.1 m wide. Alteration varies with intensity of veining, and includes chlorite, epidote, sericite, and locally K-feldspar. Gangue dominantly quartz with lesser amounts of carbonate and albite. Veins are irregular and vary from 2 to 10 cm wide. Veins generally parallel stockwork boundaries. Vein system trends generally north-south with an areal extent of 24 by 48 m and a vertical extent of 300 m. Cretaceous diorite intrudes Upper Triassic greenstone, graywacke, and argillite of western part of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). About 1,800 m of workings. Mined from 1886 to 1924. SOURCES: Wright and Wright, 1908; Knopf, 1911; Eakins, 1918.

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| SE3.<br>58 18<br>134 21 | Alaska-Juneau.<br>Au, Ag, Pb, Zn | Au quartz vein.<br>Upper(?) Mesozoic metaflysch and mafic metaigneous rocks | Produced 108 million g Au, 59.1 million g Ag, and 21.8 million kg Pb from 80.3 million tonnes ore |

DESCRIPTION: Network of quartz veins a few centimeters to 1 m thick containing sparse gold, pyrite, pyrrhotite, arsenopyrite, galena, sphalerite, chalcopyrite, and silver. Vein lode system about 5.6 km long and 600 m wide and consists of a series of parallel quartz stringers in phyllite and schist near the contact between the Upper Triassic Perseverance Slate, in amphibolite derived from late(?) Mesozoic gabbro dikes and sills, and in the informally named Gastineau volcanics of Permian and (or) Upper Triassic age. in western metamorphic belt of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Most of ore occurs in quartz veins; some in adjacent altered metamorphic rocks. Metagabbro forms irregular dikes and sills. Large-volume, low-grade mine. A few hundred kilometers of underground workings. Production from about 1893 to 1944. SOURCES: Spencer, 1906; Twenhofel, 1952; Wayland, 1960; Herreid, 1962; Goldfarb and others, 1986.

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| SE4.<br>58 15<br>134 43 | Yakima.<br>Au, Pb, Zn | Besshi massive sulfide. Upper Jurassic and Lower Cretaceous greenstone and slate | Production not recorded |

DESCRIPTION: Disseminated pyrite and minor galena and sphalerite in zone 1,600 m long and 91 m wide in Upper Jurassic and Lower Cretaceous greenstone and quartz-calcite-sericite schist, part of the Treadwell(?) Slate in the Gravina-Nutzotin belt. Local extensive hydrothermal alteration. A few hundred meters of underground workings completed by 1904. SOURCE: Spencer, 1906.

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| SE5.<br>58 15<br>134 21 | Treadwell.<br>Au, Ag, Pb | Au quartz vein. Jurassic(?) and Lower Cretaceous(?) slate and greenstone | Produced about 90.1 million g Au from 25 million tonnes ore |

DESCRIPTION: Extensive system of disseminated sulfides and quartz and quartz-calcite veins with gold, pyrite, magnetite, molybdenite, chalcopyrite, galena, sphalerite, and tetrahedrite in shattered albite diorite dikes and sills in the Jurassic(?) and Lower Cretaceous(?) slate and greenstone derived from basaltic tuff or agglomerate, part of the Treadwell Slate in the Gravina-Nutzotin belt. Some ore in zone at least 1,100 m long in slate inclusions and in adjacent wallrock. Best ore associated with abundant quartz and calcite veinlets. Deposit extends from above sea level to 790 m beneath Gastineau Channel. Four major mines connected underground. Principal mining from 1885 to 1922. SOURCES: Spencer, 1905; Buddington and Chapin, 1929.

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| SE6.<br>57 55<br>133 37 | Sweetheart Ridge.<br>Ag, Au, Cu, Pb, Zn | Metamorphosed sulfide. Upper Paleozoic or Mesozoic schist and gneiss | Estimated 6,600 tonnes grading 7.9 g/t Au, 10.6 g/t Ag, 0.7% Cu |

DESCRIPTION: Disseminations and thin, semimassive layers of chalcopyrite, pyrite, subordinate sphalerite, and sparse galena. Layers in zones up to 2 m thick in cataclastic upper Paleozoic or Mesozoic quartz-rich paragneiss and to a lesser extent in schist in the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Sulfides locally in veins that may represent remobilized portions of stratabound deposit. SOURCES: Brew and Grybeck, 1984; Kimball and others, 1984.

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| SE7.<br>57 47<br>133 28 | Sumdum<br>Ag, Cu, Zn | Metamorphosed sulfide. Paleozoic or Mesozoic paragneiss and schist | Estimated 24 million tonnes grading 0.57% Cu, 0.37% Zn and 10.3 to 103 g/t Ag, assuming deposit continues beneath Sumdum Glacier |

DESCRIPTION: Massive lenses and disseminated pyrrhotite, pyrite, chalcopyrite, sphalerite, and lesser bornite, malachite, azurite, and galena in zones up to 15 m wide. Zones occur parallel to layering along crest and flanks of isoclinal fold in metasedimentary schist and gneiss of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984), and in part in veins(?) and fault breccia that may postdate stratabound deposit. SOURCES: MacKevett and Blake, 1963; Brew and Grybeck, 1984; Kimball and others, 1984.

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| SE8.<br>57 39<br>133 27 | Sumdum Chief.<br>Au, Ag, Cu, Pb, Zn | Au quartz vein. Upper Paleozoic or Mesozoic graphitic slate and marble | Produced about 750,000 g Ag and Au each. Average grade about 13.7 g/t Au |

DESCRIPTION: Two quartz-calcite fissure veins with gold, auriferous pyrite, galena, sphalerite, chalcopyrite, and arsenopyrite. Uneven gold distribution, mainly in pockets where small veins intersect main veins. Veins, up to 6 m thick, occur in upper Paleozoic(?) or Mesozoic graphitic slate and marble of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Minimum of 1,820 m horizontal workings. SOURCES: Spencer, 1906; Brew and Grybeck, 1984; Kimball and others, 1984.

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| SE9.<br>56 31<br>132 04 | Groundhog Basin.<br>Ag, Pb, Zn | Metamorphosed sulfide.<br>Upper Paleozoic or Mesozoic schist and gneiss | Estimated several hundred thousand tonnes massive sulfide ore grading 8% Zn, 1.5% Pb, and 51.5 g/t Ag; equal amounts of disseminated sulfide ore grading 2.5% Zn and 1% Pb |

DESCRIPTION: Disseminated to massive pyrrhotite, sphalerite, subordinate magnetite, galena, pyrite, and traces of chalcopyrite. Sulfides occur in several tabular or lenticular zones up to 1 m thick in upper Paleozoic or Mesozoic calc-silicate, quartz-feldspar, and hornblende-rich gneiss and schist of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Deposits and host rocks intruded by quartz diorite and by numerous younger quartz porphyry sills and dikes. SOURCES: Buddington, 1923; Gault and others, 1953; Grybeck and others, 1984.

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| SE10.<br>56 23<br>131 24 | North Bradfield.<br>Canal.<br>Fe, Cu | Fe skarn.<br>Upper Paleozoic paragneiss | Drill core averaging 50 to 65% Fe and 0.1 to 0.5% Cu. |

DESCRIPTION: Eleven magnetite-chalcopyrite skarn bodies that form crude stratabound lenses in upper Paleozoic(?) marble and paragneiss of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984) intruded by Tertiary granite. Bodies range from 15 to 106 m long and 0.6 to 12 m thick. Sparse pyrrhotite. SOURCES: MacKevett and Blake, 1963; Sonnevil, 1981.

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| SE11.<br>56 00<br>130 04 | Riverside.<br>Ag, Au, Cu, Pb, W, Zn | Au quartz vein or polymetallic vein.<br>Triassic Texas Creek Granodiorite | Produced about 27,200 tonnes, 1925 to 1952, yielding 93,300 g Au, 3.1 million g Ag, 45,400 kg Cu, 113,500 kg Pb, 9,080 kg Zn, and 3,500 units $WO_3$ |

DESCRIPTION: Disseminated galena, pyrite, tetrahedrite, pyrrhotite, chalcopyrite, sphalerite, gold, and scheelite in two large quartz veins and in the Lindeberg lode, a combined quartz vein and epigenetic replacement deposit. Veins occur either in shear zone in schist inclusion, or in mylonitic gneiss derived from the Triassic Texas Creek Granodiorite of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). More than 1,820 m of underground workings. SOURCES: Buddington, 1929; Byers and Sainsbury, 1956; Smith, 1977.

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| SE12.<br>55 45<br>130 45 | Alamo.<br>Ag, Au, Cu, Zn | Metamorphosed sulfide.<br>Paleozoic(?) paragneiss | Grab samples and drill core with up to 0.2 to 0.7% Cu, 0.2 g/t Au, 50 g/t Ag, and minor Zn |

DESCRIPTION: Disseminated and veinlike(?) masses of chalcopyrite, pyrite, pyrrhotite, and sphalerite in zone up to 25 m wide in Paleozoic(?) paragneiss of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984) near foliated granodiorite. SOURCES: Berg and others, 1977.

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| SE13.<br>55 46<br>132 06 | Union Bay (Mount Burnett).<br>Fe, Ti, Cr, PGE | Zoned mafic-ultramafic. Cretaceous zoned ultramafic pluton | Estimated 1,000 million tonnes grading 18 to 20% Fe and possible V. Grab samples grading 0.093 g/t Pt, 0.20 g/t Pd |

DESCRIPTION: Disseminated magnetite and chromite in dunite and small, discontinuous stringers of chromite up to a few centimeters long in dunite. Dunite occurs in pipe and lopolith in center of the zoned Union Bay ultramafic pluton that intrudes Upper Jurassic and Lower Cretaceous flysch of Gravina-Nutzotin belt. Peridotite also occurs with dunite; pyroxenite and hornblende pyroxenite on periphery. SOURCE: Ruckmick and Noble, 1959.

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| SE14.<br>55 39<br>132 00 | Gold Standard (Helm Bay).<br>Au | Au quartz vein. Upper(?) Mesozoic metamorphosed flysch | Probably produced a few ten thousand g Au |

DESCRIPTION: Two sets of quartz veins with sparse gold, pyrite, lesser galena, and tetradymite. Principal vein about 300 m long and up to 2 m thick in metamorphosed upper Mesozoic phyllitic flysch and andesite tuff of Gravina-Nutzotin belt. Most ore came from older set of veins that are parallel to foliation of host rocks. Younger veins with parallel strike, but dipping in opposite direction contain little gold. SOURCE: Wright and Wright, 1908.

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| SE15.<br>55 26<br>131 31 | Mahoney.<br>Ag, Pb, Zn | Metamorphosed sulfide. Upper Paleozoic or Mesozoic flysch | Estimated 2,200 tonnes ore grading 6 to 7% Pb, and about 28% Zn. Produced several hundred tonnes Zn concentrate |

DESCRIPTION: Sphalerite and galena in discontinuous tabular to lenticular layers up to 40 cm thick in fine-grained, dark-silver gray, upper Paleozoic or Mesozoic micaceous phyllite of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Originally described as a steeply dipping vein; reinterpreted here as stratabound deposit with partial remobilization during subsequent metamorphism and deformation. Several open cuts and 100 m of underground workings. Minor production from 1947 to 1949. SOURCE: Robinson and Twenhofel, 1953; Henry C. Berg, written commun., 1984.

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| SE16.<br>55 22<br>131 12 | Sea Level.<br>Au, Ag | Au quartz vein. Upper Paleozoic or Mesozoic schistose metatuff | Unknown amount of gold produced in early 1900's |

DESCRIPTION: Quartz fissure veins with pyrite, galena, sphalerite and sparse gold in upper Paleozoic or Mesozoic schistose metatuff of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Local disseminated sulfides in wallrocks. Sulfide and gold concentrations higher where quartz vein crosscuts altered feldspar porphyry dikes. Minimum strike length of 600 m. One 36-m-deep shaft, and 363 m of horizontal workings. SOURCE: Wright and Wright, 1908.

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| SE17.<br>55 18<br>131 39 | Goldstream.<br>Au, Cu, Pb, Zn | Au quartz vein. Upper Jurassic and Lower Cretaceous greenschist and pelitic schist | Produced several thousand tonnes ore |

DESCRIPTION: Quartz veins in greenschist and quartz-sericite schist with gold, pyrite, chalcopyrite, galena, sphalerite, and arsenopyrite in Upper Jurassic and Lower Cretaceous greenschist and pelitic schist of Gravina-Nutzotin belt. Principal vein about 1 to 2.5 m wide. Several hundred meters of workings. SOURCE: Wright and Wright, 1908.

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| SE18.<br>55 18<br>131 21 | Moth Bay.<br>Cu, Zn | Metamorphosed sulfide.<br>Upper Paleozoic or<br>Mesozoic metaflysch | Estimated 91,000 tonnes grading 7.5% Zn and 1% Cu. Additional 181,000 tonnes grading 4.5% Zn, 0.75% Cu |

DESCRIPTION: Discontinuous lenses and layers of massive pyrite, pyrrhotite, and minor chalcopyrite and galena. Local disseminated pyrite. Host rocks are light brown-gray, upper Paleozoic or Mesozoic muscovite-quartz-calcite schist, minor pelitic schist and quartz-feldspar schist, possibly metachert. Layers and lenses of massive sulfides up to 1 m thick parallel to compositional layering of schist. Host rocks part of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Several open cuts and about 230 m of underground workings. SOURCES: Robinson and Twenhofel, 1953; Berg and others, 1978; Henry C. Berg, written commun., 1984.

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| SE19.<br>55 25<br>130 28 | Quartz Hill.<br>Mo | Porphyry Mo.<br>Oligocene or Miocene<br>granite porphyry | Up to 1,700 million tonnes grading 0.136% Mo. Near surface estimate of 444 million tonnes grading 0.219% Mo |

DESCRIPTION: Stockwork of molybdenite-bearing, randomly oriented quartz veins, fractures, and disseminated grains distributed throughout a multiply altered hypabyssal stock with an outcrop area of several square kilometers. Stock consists of shallow-level composite granite porphyry, quartz porphyry, microgranite, and aplite of late Oligocene or early Miocene age, and intrudes central granitic belt of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). K-Ar age of granitic rocks about 27 m.y. SOURCES: Hudson and others, 1979; P. R. Smith and J. E. Stephens, written commun., 1985.

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| SE20.<br>55 17<br>130 57 | Reliance<br>(Roe Point).<br>Cu, Zn | Metamorphosed sulfide.<br>Paleozoic(?) schist | No data |

DESCRIPTION: Massive layers and disseminated pyrite, pyrrhotite, chalcopyrite, and sphalerite in rust-weathering Paleozoic(?) schist of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). About 30 m of underground workings. SOURCE: Wright and Wright, 1908.

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| SE21.<br>55 04<br>130 31 | Red River.<br>Cu, Mo | Metamorphosed sulfide.<br>Paleozoic(?) paragneiss | No data |

DESCRIPTION: Disseminated grains and small masses of pyrite, pyrrhotite, magnetite, and molybdenite occurring along layering in Paleozoic(?) paragneiss of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984) intruded by pegmatite and gneissic granodiorite. Layers range from a few centimeters to 30 m thick. SOURCE: Berg and others, 1978.

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## KUROKO MASSIVE SULFIDE, METAMORPHOSED SULFIDE, BEDDED BARITE, SANDSTONE U, POLYMETALLIC AND Au QUARTZ VEIN, Cu-Zn-Au AND Fe SKARN, PORPHYRY Cu AND Cu-Mo, FELSIC PLUTONIC U, ZONED MAFIC-ULTRAMAFIC, AND GABBROIC Ni-Cu DEPOSITS, CENTRAL SOUTHEASTERN ALASKA

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| SE22.<br>59 26<br>135 54 | Klukwan.<br>Fe, Ti, V, Ni | Zoned mafic-ultramafic.<br>Cretaceous pyroxenite | Estimated 12 billion tonnes grading 0.2% $V_2O_5$, 13% magnetite, 1.5 to 4.4% $TiO_2$ |

DESCRIPTION: Titaniferous magnetite and minor chalcopyrite, hematite, pyrite, pyrrhotite, spinel, and leucoxene either uniformly disseminated or in tabular zones in pyroxenite surrounded by diorite. Magnetite interstitial to pyroxene and idiomorphic against hornblende. Cretaceous pyroxene and diorite intrude Triassic or older rocks of Alexander belt. No production. Nearby Klukwan fan (Takshanuk Mountain) magnetite placer deposit with

estimated 453 million tonnes grading 10% titaniferous magnetite; deposit occurs in alluvial fan at foot of mountain slope below Klukwan lode deposit. SOURCES: Wells and Thorne, 1953; Robertson, 1956; MacKevett and others, 1974; Wells and others, 1986.

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| SE23.<br>59 24<br>136 23 | Glacier Creek.<br>Ag, Au, Ba, Cu, Pb, Zn | Kuroko massive sulfide. Paleozoic and lower Mesozoic metavolcanic and metasedimentary rocks | At least 680,000 tonnes grading 45% $BaSO_4$ and up to 3% combined Cu and Zn |

DESCRIPTION: Fine-grained sphalerite, galena, chalcopyrite as disseminations, and in massive layers and lenses in metamorphosed Paleozic and lower Mesozoic mafic pillow flows, highly altered and metamorphosed quartz-feldspar porphyry, thin phyllitic siltstone and limestone. Sparse disseminated pyrite, magnetite, and tetrahedrite. Main sulfide layers and lenses associated with lenses of sericite-talc-quartz schist as much as 180 m thick in mafic extrusive rocks. Schist formed partly from alteration of mafic extrusive rocks, and partly from quartz-feldspar porphyry. Deposits up to 9 m thick and 600 m long. Sulfide layers and lenses interfoliated with beds of nearly pure barite up to 20 m thick. Sedimentary origin indicated by conformable relations between sulfide layers and bedding. Host rocks part of Alexander belt; age of host rocks uncertain. SOURCES: MacKevett and others, 1971; Hawley, 1976; Still, 1984.

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| SE24.<br>59 01<br>137 05 | Margerie Glacier.<br>Cu, Ag, Au | Porphyry Cu and lesser polymetallic vein. Tertiary granite stock | Estimated 145 million tonnes grading 0.02% Cu, 0.27 g/t Au, 4.5 g/t Ag |

DESCRIPTION: Chalcopyrite, pyrite, arsenopyrite, sphalerite, molybdenite, and minor scheelite in quartz veins in shear zones, massive sulfide bodies, and as disseminations in propylitically altered porphyritic granite stock and in adjacent hornfels. Granite intrudes Permian(?) metamorphosed pelitic and volcanic rocks, and sparse marble of Alexander belt. SOURCE: Brew and others, 1978.

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| SE25.<br>58 55<br>137 00 | Orange Point.<br>Zn, Cu, Ag, Au | Kuroko massive sulfide. Permian(?) metavolcanic rocks | Samples with up to 19% Zn, 5.2% Cu, 0.5% Ba, 0.16% Pb, 3.5 g/t Au, and 70 g/t Ag |

DESCRIPTION: Disseminated to massive pyrite, pyrrhotite, sphalerite, and chalcopyrite in zones up to 24 m wide and 169 m long in Permian(?) metaandesite flows and volcaniclastic rocks of Alexander belt. SOURCE: Brew and others, 1978.

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| SE26.<br>58 52<br>136 52 | Reid Inlet.<br>Au, Pb | Au quartz vein.<br>Cretaceous granodiorite | Produced 220,000 to 250,000 g Au |

DESCRIPTION: Zone of narrow, discontinuous, steeply dipping quartz veins up to a few hundred meters long and 1.1 m thick in altered Cretaceous granodiorite and contact-metamorphosed Permian(?) metamorphosed pelitic and volcanic rocks, and sparse marble of Alexander belt. Veins trend north-south, northeast-southwest, and east-west. SOURCES: MacKevett and others, 1971; Brew and others, 1978.

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| SE27.<br>58 59<br>136 06 | Nunatak.<br>Ag, Au, Cu, Mo | Polymetallic vein and porphyry Cu-Mo. Tertiary(?) granite porphyry | For closely-spaced vein stockwork, 2.03 million tonnes grading 0.067% Mo and 0.16% Cu; remaining stockwork with 117.5 million tonnes grading 0.026% Mo and 0.18% Cu |

DESCRIPTION: Numerous closely spaced molybdenite-bearing quartz veins, and minor disseminated molybdenite in hornfels, skarn, and a mineralized fault zone around a Tertiary(?) granite porphyry stock. Local disseminated sulfides in Tertiary(?) granite porphyry. Varying amounts of pyrite, pyrrhotite, chalcopyrite, and sparse tetrahedrite and

bornite. Granite porphyry intrudes tightly folded Paleozoic metasedimentary rocks of Alexander belt. SOURCES: MacKevett and others, 1971; Brew and others, 1978.

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| SE28.<br>58 46<br>135 15 | William Henry Bay.<br>U, Th, REE, Nb | Felsic plutonic U.<br>Tertiary(?) granite | Grab sample with 0.20% U |

DESCRIPTION: Veinlets with pyrite, chalcopyrite, galena, thorianite, and euxenite in small Tertiary(?) granite and syenite pluton intruding Silurian(?) metavolcanic and metasedimentary rocks of Alexander belt. Several small exploration pits. SOURCES: Lathram and others, 1959; Eakins, 1975.

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| SE29.<br>58 14<br>134 52 | Funter Bay.<br>Cu, Ni, Co | Gabbroic Ni-Cu. Late(?) Mesozoic gabbro-norite | Estimated 450 to 540 thousand tonnes grading 0.33 to 1% each of Cu and Ni, and 0.05 to 0.32% Co |

DESCRIPTION: Disseminated pyrrhotite, pentlandite, and chalcopyrite in olivine-hornblende gabbro at base of gabbro-norite pipe. Remainder of pipe contains much less sulfide. Pipe intrudes upper Paleozoic or Triassic quartz-mica schist of Alexander belt. SOURCES: Barker, 1963b; Noel, 1966.

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| SE30.<br>58 04<br>134 37 | Greens Creek (Big Sore).<br>Zn, Pb, Cu, Ag, Au | Kuroko massive sulfide. Upper Paleozoic or Triassic metasedimentary and metavolcanic rocks | Estimated 3.6 million tonnes grading 8% Zn, 2.7% Pb, 0.4% Cu, 360 g/t Ag, and 3.4 g/t Au |

DESCRIPTION: Sphalerite, galena, chalcopyrite, and tetrahedrite in a pyrite-rich matrix in massive pods, bands, laminations, and disseminations. Hanging wall of chlorite and sericite sedimentary rocks and pyrite-carbonate-chert exhalite. Footwall of black graphitic argillite. "Black ore" forms an extensive blanket deposit, and is composed of fine-grained pyrite, sphalerite, galena, and Ag-rich sulfosalts in laminations in black carbonaceous exhalite and argillite; "white ore" occurs along edges of massive pods, and is composed of minor tetrahedrite, pyrite, galena, and sphalerite in laminations, stringers, or disseminations in massive chert, carbonate rocks, or sulfate-rich exhalite. Local veins with bornite, chalcopyrite, and gold below massive sulfides. Veins may be brine conduits. Sulfides and host rocks underlain by serpentinized mafic volcanic flows and tuffs. Host rocks part of Alexander belt and apparently overlain structurally several kilometers away by fossiliferous Permian black carbonaceous metasedimentary rocks. Host rocks tightly folded into southeast-plunging, overturned antiform. Workings consist of a 1,300-m exploration adit. Interpreted to be an exhalative marine massive sulfide deposit formed in a late Paleozoic or Triassic back-arc or wrench fault extensional basin during deposition of arc- or continent-derived clastic and volcaniclastic sediments intermixed with mafic flows and tuffs. SOURCES: Dunbier and others, 1979; Drechsler and Dunbier, 1981; J. Dunbier and D. Sherkenbach, written commun., 1984; Henry C. Berg, written commun., 1984.

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| SE31.<br>57 58<br>134 32 | Pyrola.<br>Ag, Au, Ba, Pb, Zn | Kuroko massive sulfide. Upper Triassic(?) flows and tuffs | No data |

DESCRIPTION: Massive pyrite, sphalerite, galena, and minor chalcopyrite, jamesonite, and boulangerite in interbedded Upper Triassic(?) felsic to intermediate flows and tuff, carbonaceous siltstone, argillite, limestone, and dolomite of Alexander belt. Interlayered massive sulfide layers, barite layers, and a siliceous disseminated pyrite stockwork zone. Zone beneath massive sulfides with chlorite-carbonate alteration overprinted by intense sericite-pyrite-quartz alteration. SOURCE: Van Nieuwenhuyse, 1984.

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| SE32.<br>56 54<br>133 22 | Kupreanof Mountain.<br>Ag, Au, Cu, Zn | Cu-Zn-Au skarn.<br>Devonian(?) marble, greenschist, and phyllite | Low values of Au and Ag |

DESCRIPTION: Local massive pods, lenses, and disseminations of pyrrhotite, magnetite, chalcopyrite, and minor sphalerite and pyrite in skarn consisting of equigranular pyroxene-garnet groundmass and local large pyroxene porphyroclasts or porphyroblasts. Skarn may be in part highly altered mafic igneous rock. Skarn and marble in fault contact with Mesozoic(?) phyllite. Deposit may be related to volcanogenic massive sulfide deposits in area. Host rocks part of Alexander belt. Explored in early 1900's. Several hundred meters of underground workings on Kupreanof Island. SOURCES: Buddington, 1923; Henry C. Berg, oral commun., 1984; Grybeck and others, 1984.

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| SE33.<br>56 55<br>134 12 | Cornwallis Peninsula.<br>Zn, Pb, Ag, Cu, Ba | Metamorphosed sulfide.<br>Carboniferous marble and Upper Triassic metavolcanic rocks | No data |

DESCRIPTION: Metamorphosed sulfide deposit: Finely disseminated sphalerite and probably galena and chalcopyrite in Carboniferous limestone breccia. Bedded barite deposit: Aggregates, pods, veins, and layers of barite up to 2 m wide and 60 m long in Upper Triassic felsic metavolcanic rocks of Alexander belt. SOURCES: Berg and others, 1981; Grybeck and others, 1984; Henry C. Berg, written commun., 1985.

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| SE34.<br>56 48<br>133 57 | Port Camden.<br>U | Sandstone U.<br>Tertiary Kootznahoo Formation | Grab samples with 0.13 to 0.24% U |

DESCRIPTION: Traces of U-minerals in light-brown, poorly sorted dolomitic sandstone with clay clasts, carbonized plant fragments, and dolomitic concretions. All carbonized fragments exhibit radioactivity. Sparse magnetite, pyrite, and apatite. Dolomitic sandstone is part of the Tertiary Kootznahoo Formation which contains detritus derived from Tertiary or older granitic rocks. SOURCE: Grybeck and others, 1984.

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| SE35.<br>56 39<br>133 12 | Castle Island, Kupreanof Island.<br>Ba, Pb, Zn, Ag | Bedded barite in limestone.<br>Kuroko massive sulfide in metavolcanic and metasedimentary rocks | Produced 680,000 tonnes ore grading 90% $BaSO_4$.<br>Massive sulfide samples with up to 5% galena and sphalerite and 100 g/t Ag |

DESCRIPTION: Castle Island: Lenses of massive barite interlayered with metamorphosed Devonian or Triassic limestone, calcareous and tuffaceous clastic rocks. Trace amounts of sphalerite, galena, pyrite, pyrrhotite, bornite, tetrahedrite, and chalcopyrite. Mined by surface and underwater stripping. Kupreanof Island: Lenses of massive pyrite and lesser galena and sphalerite in Upper Triassic metamorphosed felsic volcanic and volcaniclastic rocks, chert, slate, and marble. Lenses up to 30 m long and 3 m wide. Complexly folded and faulted. Host rocks in both areas part of Alexander belt. SOURCES: Berg and Grybeck, 1980; Grybeck and others, 1984.

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| SE36.<br>56 34<br>133 04 | Helen S.<br>Ag, Au, Pb, Zn | Kuroko massive sulfide.<br>Upper Triassic(?) metavolcanic rocks | Small volume grading 6.1 g/t Au |

DESCRIPTION: Disseminated to massive pyrite, pyrrhotite, arsenopyrite, sphalerite, and galena in veins and lenses. Interlayered with Upper Triassic(?) black slate, felsic metatuff, greenstone, limestone, and mafic intrusive rocks of Alexander belt. Massive sulfide layers up to 10 cm thick. SOURCES: Berg and Grybeck, 1980; Grybeck and others, 1984.

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| SE37.<br>56 24<br>132 54 | Zarembo Island (Frenchie).<br>Ag, Pb, Zn | Kuroko massive sulfide. Upper Triassic meta-tuff | Grab samples with up to 5.5 g/t Au and 30 g/t Ag |

DESCRIPTION: Massive pyrite, pyrrhotite, sphalerite, chalcopyrite, and galena in layers and lenses up to 2 m thick in metamorphosed felsic tuff interlayered with Upper Triassic limestone and calcareous sedimentary rocks. Intruded by Tertiary(?) andesite dikes. About 30 m of underground workings developed in early 1900's. Host rocks in both areas part of Alexander belt. SOURCES: Buddington, 1923; Berg and Grybeck, 1980; Grybeck and others, 1984.

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| SE38.<br>56 18<br>133 07 | Salmon Bay.<br>U, Th, REE, Nb | Felsic plutonic U. Silurian metagraywacke intruded by Tertiary felsic dikes | Grab samples with up to 0.3% U, 0.79% REE, >0.1% La, and 0.1% Mo, 0.28% Nb, 0.21% Th |

DESCRIPTION: Carbonate fissure veins containing wide variety of minerals, including fluorite, hematite, magnetite, pyrite, chalcopyrite, thorite, monazite, zircon, parisite, and bastnaesite. Major gangue minerals are dolomite-ankerite, alkali feldspar, chalcedony, chlorite, epidote, and sericite. Veins dip steeply, are at least a few hundred meters long, and up to 1.4 m thick. Associated lamprophyre dikes. Occur in contact-metamorphosed Silurian metagraywacke of Alexander belt. Veins probably related to deformed and sheared Tertiary felsic dikes intruding metagraywacke. Similar dikes on nearby Zarembo Island contain fluorite veins. SOURCES: Grybeck and others, 1984; Henry C. Berg, written commun., 1984.

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| SE39.<br>55 55<br>134 21 | Coronation Island.<br>Pb, Zn | Polymetallic vein(?). Silurian(?) marble intruded by Tertiary(?) diorite | Produced more than 90 tonnes ore |

DESCRIPTION: Lenses of galena, sphalerite, tetrahedrite, and secondary Fe-, Pb- and Zn-minerals in clay-carbonate gangue. Lenses occur in fault zones up to 1.2 m wide in Silurian(?) marble of Alexander belt intruded by Tertiary(?) diorite. SOURCE: Twenhofel and others, 1949.

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| SE40.<br>55 38<br>132 34 | Salt Chuck.<br>Ag, Au, Cu, PGE | Zoned mafic-ultramafic. Late Paleozoic or Mesozoic mafic-ultramafic pluton | Produced about 300,000 tonnes grading 0.95% Cu, 1.2 g/t Au, 5.8 g/t Ag, 2.2 g/t PGE. Produced 610,400 g PGE. Grab samples with up to to 0.57 g/t Pt, 1 g/t Pd |

DESCRIPTION: Irregularly and randomly distributed veinlets of bornite, minor chalcopyrite, and secondary chalcocite, covellite, native copper, and magnetite. Sulfides and oxides occur along cracks and fractures in pipelike late Paleozoic or Mesozoic gabbro-pyroxenite stock intruding Silurian metagraywacke of Alexander belt. Possible local supergene enrichment. SOURCES: Howard, 1935; Gault, 1945; Donald Grybeck and David A. Brew, written commun., 1985.

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| SE41.<br>55 31<br>132 17 | Kasaan Peninsula.<br>Cu, Au, Ag | Fe skarn. Lower Lower Paleozoic calcareous metasedimentary rocks | Produced about 245,000 tonnes ore containing 5.81 million kg Cu, 215,800 g Au, 1.74 million g Ag. Estimated 2.7 million tonnes ore remaining |

DESCRIPTION: Contorted tabular masses of magnetite, chalcopyrite, and pyrite with gangue of calcite and calc-silicate minerals. About 30 masses occur along a 20-km-long belt. Masses occur mainly along contacts between conformable lower Paleozoic calcareous metasedimentary rocks and mafic metavolcanic rocks that are adjacent to irregular dikes, sills, and plugs of Ordovician or Silurian diorite, quartz monzodiorite, and mafic dikes. Skarns to north contain epidote-quartz endoskarn and pyroxene-garnet-epidote exoskarn with

chalcopyrite, magnetite, and calcite. Skarns to south contain hornblende, magnetite, chalcopyrite, and pyrite with low Ag and Au. Host rocks part of Alexander belt. Extensive underground workings. SOURCES: Warner and others, 1961; Myers, 1984.

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| SE42.<br>55 28<br>132 42 | Dawson.<br>Au, Cu, Pb, Zn | Au quartz vein or polymetallic vein. Black graphitic slate | Probably produced several ten thousand g Au and Ag each, and minor Pb. Estimated 40,000 tonnes grading 34.3 g/t Au |

DESCRIPTION: Quartz stringers and veins in zone 0.6 to 1.8 m wide. Most gold concentrated along contacts of stringers and lower(?) Paleozoic black graphitic slate of Alexander belt. Scattered pyrite, sphalerite, chalcopyrite, and galena in stringers, veins, and wallrocks. Mined from 1900 to 1948. Workings to minimum depth of 181 m. Recent drilling and development. SOURCES: Wright and Wright, 1908; Harris, 1985.

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| SE43.<br>55 18<br>132 23 | Khayyam.<br>Ag, Au, Cu, Zn | Kuroko massive sulfide. Lower Paleozoic metavolcanic rocks | Produced about 6.4 million kg Cu, 40,120 g Au, 53,200 200 g Ag from 205,000 tonnes ore. Channel samples with up to 5.25% Cu, 6.9 g/t Au, 106 g/t Ag |

DESCRIPTION: Irregular, elongate, nearly vertical lenses of massive pyrite, chalcopyrite, sphalerite, pyrrhotite, hematite, gahnite, and magnetite. Gangue of quartz, calcite, epidote, garnet, and chlorite. About seven stacked sulfide lenses up to 70 m long and 6 m thick. Lenses conformable to enclosing felsic to mafic metavolcanic host rocks of the pre-Middle Ordovician Wales Group in the Alexander belt. Coarse fragmental textures in metavolcanic host rocks. Intense chlorite alteration in footwall below sulfide lenses. Lateral gradation between sulfide lenses and enclosing schist. Several hundred meters of underground workings. Principal mining from 1901 to 1907. SOURCES: Fosse, 1946; Barrie, 1984a, b.

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| SE44.<br>55 15<br>132 37 | Jumbo district.<br>Fe, Ag, Au, Cu | Cu-Au skarn.<br>Lower Paleozoic marble and metasedimentary rocks | Jumbo: Estimated 280,000 tonnes grading 45% Fe, 0.73% Cu. Produced 4.6 million kg Cu, 220,000 g Au, and 2.73 million g Ag from 111,503 tonnes ore |

DESCRIPTION: District includes major deposit at Jumbo, moderate deposits at Magnetite Cliff, Copper Mountain, and Corbin, and lesser deposits at Upper Magnetite, Gonnason, Houghton, Green Monster, Hetta, and Corbin. Deposits all within a few kilometers of Jumbo deposit. Jumbo deposit: chalcopyrite, magnetite, sphalerite, and molybdenite in skarn at contact between marble and Early Cretaceous granodiorite stock. Gangue is mainly diopside and garnet. More than 3.2 km of underground workings. Magnetite Cliff: 25-m-thick shell of magnetite that mantles Early Cretaceous granodiorite in contact with garnet-diopside skarn. Skarn contains 2% to 3% chalcopyrite and 335,600 tonnes grading 46% Fe and 0.77% Cu. Production from 1902 to 1922. Copper Mountain: Scattered chalcopyrite and copper carbonate in diopside endoskarn in granodiorite with veins and masses of epidote, garnet, magnetite, and scapolite. Produced 101,800 kg Cu, 321,300 g Ag, and 4,510 g Au between 1902 and 1907. About 410 m of tunnels and shafts. Deposits occur in or adjacent to lower Paleozoic marble and pelitic metasedimentary rocks intruded by mid-Cretaceous hornblende-biotite granodiorite with concordant hornblende and biotite K-Ar ages of 103 m.y. Wallrocks part of the Wales Group in Alexander belt. SOURCES: Kennedy, 1953; Herreid and others, 1978.

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| SE45.<br>55 08<br>132 37 | Copper City.<br>Cu, Zn, Ag, Au | Metamorphosed sulfide(?). Lower Paleozoic metavolcanic and metasedimentary rocks | Chip sample with 8.5% Cu, 7.3% Zn, 85.8 g/t Ag, 1.7 g/t Au, 0.06% Pb |

DESCRIPTON: Massive chalcopyrite, pyrite, sphalerite, and rarely hematite with gangue quartz, calcite, and epidote occurring in zone up to 1.2 m thick in layers parallel to enclosing metakeratophyre, metaspilite, and quartz-mica schist. Local crosscutting quartz veins and diabase dike. Host rocks part of the pre-Middle Ordovician Wales Group in Alexander belt. Produced about 1,450 tonnes ore between 1898 and 1910. Deposit remobilized during regional metamorphism. SOURCES: Wright and Wright, 1906; Herreid and others, 1978.

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| SE46.<br>55 11<br>132 23 | Moonshine.<br>Ag, Pb, Zn, Cu | Metamorphosed sulfide. Lower Paleozoic metasedimentary rocks | Produced up to 46,500 g Ag. Grab samples with 20 to 83% Pb, 411 to 1,030 g/t Ag |

DESCRIPTION: Galena, sphalerite, minor chalcopyrite, and accessory pyrite and siderite in well-defined fissure veins or reniform pods up to a few meters wide in a dolomitized vein breccia cutting obliquely across marble and metasedimentary rocks. Gangue of quartz, siderite, and calcite. Local diabase dikes crossing fissure and wallrocks. Several tunnels and shafts. Minor production between 1900 and 1909. Wallrocks part of the pre-Middle Ordovician Wales Group in Alexander belt. SOURCES: Wright, 1909; Herreid and others, 1978.

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| SE47.<br>55 03<br>132 38 | Lime Point.<br>Ba | Bedded barite. Lower Paleozoic metasedimentary rocks | Estimated 4,500 tonnes grading 91% barite |

DESCRIPTION: Interlayered lenses of barite and dolomite up to 2 m thick in lower Paleozoic marble of the pre-Middle Ordovician Wales Group in Alexander belt. Local faulting and folding and andesite dikes intruded along faults. One short adit. Test shipments; no production. SOURCES: Twenhofel and others, 1949; Herreid and others, 1978.

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| SE48.<br>55 09<br>132 03 | Golden Fleece.<br>Ag, Au | Au quartz vein. Lower Paleozoic marble and schist | Considerable production; no records. Assays with 81 to 341 g/t Ag and 1.7 to 143 g/t Au |

DESCRIPTION: Irregular quartz fissure veins up to 3 m thick with pyrite, tetrahedrite, and gold in silicified and dolomitized marble cut by postmineralization diabase dikes. Local solution caverns along vein system. Veins localized along conjugate(?) system of Cenozoic(?) faults subsidiary to Clarence Strait fault zone. Host rocks part of the pre-Middle Ordovician Wales Group in Alexander belt. Several hundred meters of workings. Principal mining during 1900 to 1930. SOURCES: Herreid, 1967; Henry C. Berg, written commun., 1984.

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| SE49.<br>55 04<br>132 09 | Niblack.<br>Cu, Au, Ag | Kuroko massive sulfide. Lower Paleozoic metavolcanic rocks | Produced about 636,000 kg Cu, 34,200 g Au, 466,500 g Ag |

DESCRIPTION: Lenticular masses and disseminations of chalcopyrite, pyrite, and lesser sphalerite, galena, hematite, and magnetite in mainly quartz-sericite schist derived from pre-Ordovician(?) felsic volcanic or volcaniclastic rocks. Felsic metavolcanic rocks interlayered with intermediate to mafic metavolcanic rocks and lesser slate. Host rocks part of the pre-Middle Ordovician Paleozoic Wales Group in Alexander belt. Workings consist of a 100-m shaft and about 1.6 km of underground workings. Main mining from 1902 to 1909. Recent development. SOURCE: Herreid, 1964.

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| SE50.<br>55 11<br>131 44 | Bay View.<br>Au, Cu | Polymetallic vein(?).<br>Silurian trondhjemite | Grab samples with up to 10 g/t Ag, 0.1 g/t Au, >2% Cu, 0.015% Sn, and 0.020% As. Small smelter shipment; no recorded production |

DESCRIPTION: Quartz- and calcite-cemented fault breccia with disseminations and small masses of pyrite, chalcopyrite, and minor sphalerite and bornite mainly in brecciated basalt dike in fault-bounded block of trondhjemite. Upper Triassic metarhyolite tuff adjacent to fault block. Colloform calcite and other textures indicate deposition at relatively shallow depth and low temperature. Host rocks part of Alexander belt. Workings include open cuts, adit, and 30-m drift. SOURCES: Berg, 1973, Elliott and others, 1978; Henry C. Berg, written commun., 1984.

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| SE51.<br>54 56<br>132 08 | Bokan Mountain.<br>U, Th, REE, Nb | Felsic plutonic U.<br>Jurassic peralkaline granite | Produced about 109,000 tonnes grading about 1% $U_3O_8$; Th not recovered |

DESCRIPTION: Disseminated U, Th, REE, and niobate minerals, including uranothorite, uranoan thorianite, uraninite, xenotime, allanite, monazite, pyrite, galena, zircon, and fluorite in irregular, steeply dipping pipe of Jurassic peralkaline granite. Most of ore produced from crudely cigar-shaped upper part of pluton. Central zone grades outward into normal granite. Associated pegmatite and vein REE, Nb, Th, and U deposits in outer parts of granite or adjacent country rock that consists of early Paleozoic metamorphosed granitic and sedimentary rocks of Alexander belt. Intermittent mining from 1955 to about 1971. SOURCES: MacKevett, 1963; Thompson and others, 1982; Lancelot and de Saint-Andre, 1982; Armstrong, 1985; Edward M. MacKevett, Jr., written commun., 1986; J. Dean Warner, written comun., 1987.

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| SE52.<br>54 48<br>132 27 | Barrier Islands.<br>Ag, Au, Cu, Pb, Zn, Ba | Kuroko massive sulfide.<br>Lower Paleozoic metavolcanic rocks | Grab samples with up to 10% Zn, 0.15% Pb, 30 g/t Ag, and 0.25 g/t Au |

DESCRIPTION: Disseminated to massive pyrite and minor sphalerite, galena, and arsenopyrite in zones up to a few meters long and 3 m thick. Sulfides also form rinds of pillows in metavolcanic rocks. Hosted in Ordovician and Silurian felsic to intermediate metavolcanic rocks and metagraywacke of Alexander belt. SOURCE: Gehrels and others, 1983.

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| SE53.<br>55 11<br>131 36 | Driest Point and nearby area on Gravina Island<br>Cu, Pb, Ba | Kuroko massive sulfide(?). Triassic(?) metavolcanic and metasedimentary rocks | No data |

DESCRIPTION: Disseminated to massive pyrrhotite, pyrite, and possibly sphalerite in zones up to a few meters thick in carbonaceous sedimentary rocks and chert at contact between Upper Triassic metarhyolite, and slate and limestone. Vein deposits with disseminated galena, chalcopyrite, and pyrite in veins in shear zones up to 3 m wide. Gangue of quartz, calcite, and barite in Triassic(?) metarhyolite. Host rocks part of Alexander belt. Vein deposits probably formed during Cenozoic remobilization of older massive sulfide deposit. SOURCE: Berg and others, 1981.

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| SE54.<br>54 55<br>131 21 | Duke Island.<br>Cr, PGE | Zoned mafic-ultramafic.<br>Cretaceous(?) ultramafic pluton | Grab samples averaging 0.037 g/t Pt and 0.033 g/t Pd |

DESCRIPTION: Disseminated to locally massive titaniferous magnetite and sparse chromite in hornblende-clinopyroxene zones in zoned ultramafic pluton of Cretaceous(?) age. Zoned ultramafic pluton intrudes early Paleozoic felsic metavolcanic rocks, early Paleozoic diorite, and Triassic gabbro of Alexander belt. SOURCES: Clark and Greenwood, 1972; Irvine, 1974; Berg and others, 1981.

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| SE55.<br>58 33<br>136 56 | Brady Glacier.<br>Cu, Ni, PGE | Gabbroic Ni-Cu.<br>Tertiary stratiform mafic-ultramafic pluton | Estimated 82 to 91 million tonnes grading 0.53% Ni, 0.33% Cu, 0.03% Co, minor PGE. Grab samples grading 0.18 to 1.30 g/t PGE |

DESCRIPTION: Disseminations and a few small masses of pentlandite, chalcopyrite, and rare pyrite near eastern edge and probable base of large layered mafic-ultramafic pluton consisting mainly of gabbro with sparse peridotite; part of La Perouse gabbro pluton. Locally up to 10% disseminated sulfides. Deposit mainly beneath Brady Glacier, but exposed in small nunataks. Pluton intrudes metagraywacke and phyllite of the Cretaceous Sitka Graywacke. SOURCE: Brew and others, 1978; Czamanske and Calk, 1981; Himmelberg and Loney, 1981.

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| SE56.<br>57 58<br>136 25 | Bohemia Basin.<br>Ni, Cu | Gabbroic Ni-Cu.<br>Tertiary norite stock | Estimated 19 million tonnes grading 0.33% Ni 0.21% Cu, 0.01% Co |

DESCRIPTION: Magmatic segregations chiefly of pyrrhotite, pentlandite, and chalcopyrite. Occur in troughlike body about 45 m thick near base of basin-shaped, composite norite stock of Tertiary age. Norite locally grades into gabbro and diorite. Norite stock intrudes metagraywacke, phyllite, and greenschist of the Cretaceous and Cretaceous(?) Kelp Bay Group. SOURCES: Kennedy and Walton, 1946; Johnson and others, 1982.

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| SE57.<br>57 57<br>137 16 | Apex and El Nido.<br>Au, Ag, Cu, Pb, W, Zn | Au quartz vein(?).<br>Mesozoic diorite | Produced about 622,000 g Au and 93,300 g Ag |

DESCRIPTION: Quartz fissure veins up to 2 m thick and wider stockwork with pyrite, arsenopyrite, chalcopyrite, galena, sphalerite, tetrahedrite, and gold. Minor sulfides in wallrocks of altered diorite. Deposit also contains disseminations, veinlets, and small masses of scheelite. Host rocks are diorite pluton and amphibolite mass in pluton. Vein system symmetrical around vertical fault that bisects deposit. Pluton intrudes upper Paleozoic low-grade pelitic and intermediate volcanic rocks. About 1.6 km of workings. Production from 1912 to 1939. SOURCES: Reed and Coats, 1941; Still and Weir, 1981; Johnson and others, 1982.

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| SE58.<br>57 51<br>136 13 | Cobol.<br>Au, Cu, Pb, Zn | Au quartz vein(?).<br>Cretaceous(?) quartz diorite | Produced about 3,100 g Au from about 120 tonnes ore |

DESCRIPTION: Quartz fissure vein up to 0.6 m wide with arsenopyrite, sphalerite, galena, pyrite, and chalcopyrite in Cretaceous(?) quartz diorite, and upper Paleozoic greenstone, quartzite, and siliceous limestone. Quartz diorite locally altered near veins. SOURCES: Reed and Coats, 1941; Johnson and others, 1982.

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| SE59.<br>57 47<br>136 19 | Mirror Harbor.<br>Ni, Cu, Co | Gabbroic Ni-Cu.<br>Tertiary norite stock | Largest ore body contains about 7,300 tonnes grading about 1.57% Ni, 0.88% Cu, and 0.04% Co |

DESCRIPTION: Disseminated, intergrown pyrrhotite, pentlandite, and chalcopyrite in Tertiary composite norite stock. Local sulfide pods. Stock intrudes contact-metamorphosed metagraywacke and phyllite of the Cretaceous Sitka Graywacke. SOURCES: Pecora, 1942; Kennedy and Walton, 1946; Johnson and others, 1982.

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| SE60.<br>57 49<br>136 14 | Baker Peak.<br>Cu | Basaltic Cu(?).<br>Triassic(?) Goon Dip Greenstone | Grab samples with 2.0 to 7.5% Cu, and minor Au and Ag |

DESCRIPTION: Small masses and disseminations of chalcopyrite and pyrite in zones up to 4 m wide and 120 m long in massive, amygdaloidal, subaerial metabasalt flows of the Triassic(?) Goon Dip Greenstone. Zones strike northwest-southeast, dip vertically. Greenschist-facies metamorphism of metabasalt. Local aplite dikes. Several trenches and minor underground workings. SOURCE: Johnson and others, 1982.

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| SE61.<br>57 40<br>136 07 | Chichagoff, Hirst-Chichagof.<br>Au, Ag, Pb, Cu | Au quartz vein.<br>Cretaceous metagraywacke and phyllite | Produced about 24.6 million g Au, 1.24 million g Ag, and minor Pb and Cu. Estimated 91,000 tonnes grading 41.2 g/t Au |

DESCRIPTION: Tabular to lenticular bodies of quartz a few meters thick, a few hundred meters long horizontally, and up to a few thousand meters in length along plunge. Mainly ribbon quartz with minor massive sulfide with pyrite, arsenopyrite, galena, sphalerite, chalcopyrite, and local scheelite and tetrahedrite. Ore shoots localized within shear and gouge zones in Hirst and Chichagof faults, and probably along warps in the faults. Quartz bodies occur in metagraywacke and argillite of the Cretaceous Sitka Graywacke. Production from about 1905 to 1940. Extensive underground workings on 12 levels up to 1,200 m deep and 1,440 m long. Recent drilling and development. SOURCES: Reed and Coats, 1941; Still and Weir, 1981; Johnson and others, 1982; Alaska Mines and Geology, 1985.

## SIGNIFICANT PLACER DISTRICTS OF ALASKA

By Warren Yeend, Thomas K. Bundtzen, and Warren J. Nokleberg

| MAP NUMBER.<br>LATITUDE<br>LONGITUDE | DISTRICT.<br>METALS | TYPE.<br>LOCAL BEDROCK | GOLD PRODUCTION, GRAMS.<br>GOLD CONCENTRATION,<br>GRAMS/CUBIC METER |
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| | | BROOKS RANGE | |
| PL1.<br>67 10<br>160 15 | Kiana.<br>Au, nephrite | Placer Au.<br>Marble, schist | 217,700 g Au |

DESCRIPTION: Gold mined principally from tributaries of Squirrel River. Coarse gold, some nuggets with quartz attached. Magnetite common in concentrates. Gold and magnetite probably derived from Au quartz vein lode deposits. SOURCES: I. M. Reed, written commun., 1931; Cobb, 1973.

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| PL2.<br>67 00<br>157 00 | Shungnak.<br>Au, Cu, Ag,<br>Cr, Cd | Placer Au. Metasedi-<br>mentary and metavol-<br>canic rocks | 466,500 g Au |

DESCRIPTION: Placer deposits on streams draining Cosmos Hills. Gold source mostly Au quartz veins in metasedimentary and metavolcanic rocks. Most of production from Dahl Creek. Heavy minerals include gold, magnetite, chromite, native copper, and silver. Nephrite and serpentinite boulders collected from creek gravels and tailings piles. Large numbers of quartz crystals recovered from placer operations. SOURCES: Smith, 1913b; Anderson, 1945; Cobb, 1973.

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| PL3.<br>68 00<br>156 00 | Noatak.<br>Au | Placer Au. Schist, mar-<br>ble, metasedimentary and<br>metavolcanic rocks | 280,000 g Au |

DESCRIPTION: Gold mined from Lucky Six Creek; nearby lode deposit contains sulfides and gold. Gold probably derived from Au quartz or polymetallic vein lode deposits. SOURCES: Smith, 1913b; Cobb, 1973.

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| PL4.<br>67 15<br>150 45 | Wiseman<br>(Koyukuk).<br>Au, Bi, Cu, W,<br>Pb | Placer Au. Metasedimen-<br>tary rocks, granitic<br>plutons, Cretaceous<br>sedimentary rocks | 9.02 million g Au |

DESCRIPTION: Glaciation in parts of area has caused derangements of drainage, resulting in complex placer deposits. Gold-rich gravels in modern streams and bench deposits on bedrock. Large nuggets more common than elsewhere in Alaska. Heavy minerals include gold, stibnite, native silver, native copper, native bismuth, scheelite, pyrite, chalcopyrite, cinnabar, rutile, cassiterite, monazite, andalusite, and kyanite. Larger deposits at Hammond River and Nolan Creek. Hammond River: estimated 210,000 $m^3$ grading 5.1 $g/m^3$ Au and 0.32 $g/m^3$ Ag; total production of up to 1.84 million g Au; estimated production of 3.1 million g Ag; drift and sluice mining; placer deposit mostly occurs within lower 5 km of mouth of Koyukuk River; placer mining from 1900 until 1942. Nolan Creek: estimated 146,000 $m^3$ grading 12 $g/m^3$ Au; drift mining; local stibnite veins in metamorphic and granitic rocks. Deposits in district probably derived from Au quartz vein and Sb-Au vein lode deposits. SOURCES: Maddren, 1913; I. M. Reed, written commun., 1938; Brosgé and Reiser, 1960; Cobb, 1973; Dillon, 1982.

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| PL5.<br>67 50<br>148 00 | Chandalar.<br>Au, Sb, Hg, Cu, Ag, W, Pb, Mo | Placer Au. Metasedimentary and metavolcanic rocks | 964,100 g Au |

DESCRIPTION: Complicated placer deposits resulting from complicated glacial history. Two generations of placer deposits on Little Squaw Creek, one preglacial, one postglacial. Placers located in streams draining Au quartz vein lode deposits. Heavy minerals include gold, monazite, magnetite, hematite, rutile, pyrite, arsenopyrite, chalcopyrite, galena, stibnite, molybdenite, scheelite, and uranothorianite. Largest deposit at Little Squaw Creek: both preglacial and postglacial placer deposits; significant production; local Au quartz veins in schist; associated with Little Squaw Au gold quartz deposit. SOURCES: Mertie, 1925; Cobb, 1973; Dillon, 1982.

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SEWARD PENINSULA AND WESTERN YUKON-KOYUKUK BASIN

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| PL6.<br>64 30<br>165 30 | Nome.<br>Au, Cu, Pb, Zn, Bi, W, Sn, Sb | Placer Au. Felsic and mafic schist, Au quartz veins | 109 to 140 million g Au. 10.2 $g/m^3$, Anvil Creek. 2.0 to 8.1 $g/m^3$ for submarine deposits |

DESCRIPTION: Bulk of gold from ancient beach gravels developed in till. Up to five separate elevated beaches and several submerged beaches. Modern stream gravels, and low and high alluvial benches also contain gold. Estimated 700 million $m^3$ grading 0.14 $g/m^3$. Gold in district probably derived from Au quartz vein lode deposits in the Nome district. SOURCES: Collier and others, 1908; Moffit, 1913; Nelson and others, 1969; Cobb, 1973; Eakins, 1981.

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| PL7.<br>65 40<br>166 30 | Port Clarence.<br>Sn, Au, REE, W, Cr, Pb, Ag, Hg, Pt | Placer Au and Sn.<br>Slate, schist, granitic plutons | 870,800 g Au |

DESCRIPTION: Gold recovered from creeks and benches as much as 60 m above present-day streams. Dredges produced bulk of gold. Gold in district probably derived from Sn lode deposits associated with Cretaceous granitic plutons. Sn province occurs in western part of the district; total tin production about 1,814 tonnes Sn concentrate from both lode and placer deposits. Cape Creek placer deposit in Cape Prince of Wales area has produced about 68,100 to 90,800 kg cassiterite concentrate per year. Tin placers on streams draining contact zones around Cretaceous Sn-bearing granitic rocks and associated vein lode deposits. Heavy minerals in both gold and tin placers of gold, cassiterite, scheelite, cinnabar, monazite, xenotime, zircon, columbite, tantalite, wolframite, chromite, powellite. SOURCES: Brooks, 1901; Collier and others, 1908; Mulligan, 1959; Cobb and Sainsbury, 1972.

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| PL8.<br>65 45<br>164 50 | Kougarok.<br>Au, Sn, Pb, Ag, W, Hg | Placer Au and Sn.<br>Schist, slate, marble, granitic rocks | 46.7 million g. 0.14 Au $g/m^3$, Kougarok Gravels |

DESCRIPTION: Large gold resources in Quaternary(?) glacial outwash gravels of the Tertiary and Quaternary(?) Kougarok Gravels, estimated 93.3 million g in 671.4 million $m^3$ of gravel. Buried Tertiary gravels and conglomerates may be gold source. Most mining by dredging. Heavy minerals include gold, pyrite, magnetite, hematite, cassiterite, scheelite, cinnabar, and lead sulfides. Richest areas in Iron Creek and Kougarok valley. Derived mainly from polymetallic vein and Sn lode deposits associated with Cretaceous granitic plutons. SOURCES: Collier and others, 1908; Cobb, 1973; Eakins, 1981.

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| PL9.<br>64 45<br>163 30 | Council.<br>Au, W, Hg, Cu | Placer Au. Schist, marble, dolomite, thin quartz veins | 31.1 million g Au.<br>0.4 to 0.7 g/m$^3$,<br>Spruce Creek |

DESCRIPTION: Beach, modern stream, and rare bench gold placers. Mined mainly by dredging and sluicing. Gold in district probably derived from Au quartz vein lode deposits in metamorphic rocks of the Nome Group. SOURCES: Collier and others, 1908; Smith, 1910; Smith and Eakin, 1911; Cobb, 1973.

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| PL10.<br>65 00<br>161 20 | Koyuk.<br>Au, Sb, W, Bi | Placer Au. Schist, marble, granitic plutons, Cretaceous sedimentary rocks | 1.62 million g Au |

DESCRIPTION: Mining in creek and bench placers on Bonanza, Dime, and Sweepstakes Creeks areas; nuggets with vein quartz attached have been recovered. Mining by sluicing, dredging, and drifting. Heavy minerals include gold, magnetite, ilmenite, scheelite, stibnite, bismuthinite, wolframite, platinum, chromite, rutile, garnet, uranothorianite, hydrothorite, hematite, chrome spinel, iron and copper sulfides, galena, sphalerite, and molybdenite. Gold probably derived from polymetallic vein and other lode deposits associated with Cretaceous granitic plutons. SOURCES: Smith and Eakin, 1911; Harrington, 1919; Cobb, 1973.

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| PL11.<br>65 45<br>161 41 | Fairhaven.<br>Au, Pb, Hg, Cu<br>W, Pt, REE, Bi,<br>Cr, Mo, Ag | Placer Au. Schist, marble, granitic plutons, Tertiary basalt | 14.2 million g Au.<br>0.12 to 0.75 g/m$^3$,<br>Mud Creek |

DESCRIPTION: Rich placer gold areas on Candle Creek and Inmachuk River. Buried gold-rich channel gravel in vicinity of Mud Creek. Major streams extensively dredged; substantial resources remain unmined in buried drainages in northern part of district. Gold probably derived from polymetallic vein lode deposits associated with Cretaceous granitic plutons. SOURCES: Henshaw, 1909; Cobb, 1973.

## WEST-CENTRAL ALASKA

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| PL12.<br>59 00<br>161 10 | Goodnews Bay.<br>Pt, Cr, Au | Placer PGE-Au.<br>Mafic and ultramafic plutons | Over 20.2 million g PGE,<br>933,000 g Au |

DESCRIPTION: Most extensive deposits on the Salmon River. Platinum and gold mined by dredging. Production mainly from 1934 to 1976, a major portion of the primary U.S. production. Average percentages in placer concentrates are 73.6% Pt, 9.9% Ir, 1.9% Os, 0.15% Rh, 1.2% Ru, 0.34% Pd, 2.1% Au, and 10.9% impurities. Pt and Cr, and some Au are apparently derived from the nearby informally named Middle Jurassic Goodnews Bay ultramafic complex of Southworth and Foley (1986), composed of dunite, pyroxenite, and hornblendite, with sparse anomalous PGE concentrations associated with sparse chromite segregations. Most of gold probably derived from reworking of glacial deposits which are probably derived from the Goodnews Bay ultramafic complex. SOURCES: Mertie, 1940, 1969; 1976; Berryhill, 1963; Cobb, 1973; Southworth and Foley, 1986.

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| PL13.<br>61 55<br>161 30 | Marshall.<br>Au, Pt, Ag, W,<br>Hg | Placer Au and PGE. Cretaceous sedimentary and volcanic rocks, granitic plutons | 2.99 million g Au |

DESCRIPTION: Productive placers on Wilson Creek and tributaries. Most of area nonglaciated. Heavy minerals include gold, platinum, magnetite, hematite, ilmenite, scheelite, and cinnabar. Possibly derived from vein lode deposits associated with Cretaceous hypabyssal granitic and volcanic rocks. SOURCES: Harrington, 1918; Hoare and

Cobb, 1972.

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| PL14.<br>61 00<br>158 00 | Aniak.<br>Au, W, Cr, Hg, Pt, Ag | Placer Au and Hg. Cretaceous sedimentary and volcanic rocks, granitic plutons | 7.62 million g Au |

DESCRIPTION: Placer gold mined from modern streams and benches; Nyac area and Crooked Creek basin most productive. Heavy minerals include gold, magnetite, garnet, scheelite, cassiterite, pyrite, cinnabar, stibnite, and monazite. Placer cinnabar mined from Cinnabar Creek. Gold probably derived from polymetallic vein lode deposits in contact zones in graywacke of the Cretaceous Kuskokwim Group intruded by Cretaceous hypabyssal granitic plutons. SOURCES: Cady and others, 1955; Cobb, 1973.

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| PL15.<br>62 30<br>158 30 | Iditarod.<br>Au, Hg, Sb, Sn, W, Cr, REE, Ag | Placer Au. Paleozoic schist, Mesozoic clastic and volcanic rocks, Cretaceous granitic plutons | 41.1 million g Au |

DESCRIPTION: Gold placer deposits in modern stream gravels, residual concentrations, and benches. All mining within 14 km of Flat. Extensive dredging. Nonglaciated highlands are mantled by residual material, colluvium, and silt; lowlands are covered by thick masses of alluvium. Gold derived from polymetallic vein lode deposits in Cretaceous monzonite stocks, from auriferous Golden Horn deposit, and from other mineralized contact zones in sedimentary and volcanic rocks of the Cretaceous Kuskokwim Group. SOURCES: Cobb, 1973; Bundtzen and others, 1985b.

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| PL16.<br>63 30<br>156 30 | Innoko.<br>Au, Hg, Pt, Sn, W | Placer Au. Cretaceous metasedimentary and metavolcanic rocks, chert, basalt, felsic dikes | 16.8 million g Au.<br>0.41 to to 0.83 $g/m^3$ |

DESCRIPTION: Bulk of gold from placers on bedrock benches that have no surface expression. Minor platinum, about 1% of gold content, recovered from Boob Creek. Some dredging. Most of district nonglaciated. Gold derived from mineralized rhyolite and basalt dike swarms in the Kuskokwim Group in the Yankee Creek, Ophir Creek, and Spruce Creek areas. SOURCES: Harrington, 1919; Mertie, 1936; Cobb, 1973; Bundtzen and Laird, 1980; Bundtzen and others, 1985.

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| PL17.<br>62 45<br>155 00 | McGrath.<br>Au, Sn, W, Bi, REE, Hg, Cu, Pb | Placer Au. Paleozoic limestone, Cretaceous sandstone, shale, and granitic rocks | 4.01 million g Au, accessory Hg, Ag |

DESCRIPTION: Stream and bench placers mined by hydraulic methods and one dredge. Candle Creek area most productive and contained 62-g gold nuggets. Heavy minerals include gold, cinnabar, chromite, zircon, magnetite, pyrite, and scheelite. Gold in district probably derived from polymetallic vein, and related lode deposits in and near Cretaceous hypabyssal monzonite plutons, and sedimentary and volcanic rocks of the Cretaceous Kuskokwim Group. SOURCES: Mertie, 1936; Cobb, 1973; Bundtzen and Laird, 1983b.

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| PL18.<br>64 25<br>154 20 | Ruby.<br>Au, Sn, Bi, REE, Pb, W, Pt | Placer Au. Limestone, schist, volcanic rocks, chert, granitic plutons | 12.1 million g Au |

DESCRIPTION: Complex geomorphic history. Vein quartz, chert, and other resistant rocks common in placers. Several cycles of erosion and deposition. Placers generally buried; mined with shafts and drifts. Region nonglaciated. Heavy minerals include gold, cassiterite, platinum, scheelite, allanite, and native bismuth. Largest deposit at Midnight Creek: estimated 88,000 $m^3$ grading 1.3 $g/m^3$; produced about 114,000 g Au, from

1940 to 1942; bedrock of local quartz veins in schist in or near granite; minor Sn placer deposits. Gold in district probably derived from polymetallic vein and skarn lode deposits associated with Cretaceous hypabyssal granitic plutons. SOURCE: Eakin, 1918; Mertie and Harrington, 1924; Cass, 1959; Chapman and others, 1963; Cobb, 1973.

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| PL19.<br>65 50<br>155 00 | Hughes.<br>Au, Cu, Pb, Ag,<br>Sn, Pt, Zn | Placer Au. Jurassic and Cretaceous clastic and volcanic rocks, granitic plutons | 6.25 million g Au |

DESCRIPTION: Gold derived from streams draining contact zones around Cretaceous granitic plutons near Indian Mountain and in southern Zane Hills. Recent dredging on Bear Creek. Most of area nonglaciated. Gold probably derived from polymetallic vein and other lode deposits associated with Cretaceous granitic plutons. SOURCES: Eakin, 1916; Miller and Ferrians, 1968; Cobb, 1973.

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| PL20.<br>65 30<br>152 30 | Melozitna.<br>Au, Sn, Pb,<br>Ag, Zn, Cu | Placer Au. Metasedimentary and metavolcanic rocks, Cretaceous clastic and granitic rocks | 31,000 to 156,500(?) g Au |

DESCRIPTION: Gold occurs in thin bench deposits and shallow-stream gravels. Heavy minerals include gold, cassiterite, magnetite, ilmenite, hematite, garnet, and tourmaline. Placers within a few kilometers of known or inferred granitic plutons. No known lode deposits. Gold in district probably derived from polymetallic vein and skarn lode deposits associated with Cretaceous hypabyssal granitic plutons. SOURCES: Eakin, 1912; Chapman and others, 1963; Cobb, 1973.

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## EAST-CENTRAL ALASKA

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| PL21.<br>65 10<br>151 00 | Hot Springs.<br>Au, Sn, Cr, REE,<br>Cu, Pb, Ag, Ni,<br>Hg, W, Bi, Nb | Placer Au and Sn. Sedimentary rocks, Tertiary, granitic plutons and gravels | 14 million g Au |

DESCRIPTION: Nearly all placer deposits consist of buried bench gravels on old terraces or buried stream deposits derived from older bench gravels. Thick deposits of frozen silt conceal deposits and make exploration difficult. Area nonglaciated. Production of about 213,000 kg Sn from placer deposits in Tofty tin belt; source unknown. Larger gold deposits at Glen Creek and American Creek. Glen Creek: estimated 600,000 $m^3$ grading 2.5 $g/m^3$; over 1.50 million g produced by 1931; gravels derived from local slate and quartzite with quartz veinlets. American Creek: estimated 410,000 $m^3$ grading 5.3 g per $m^3$; total production at least 2.18 million g Au; gold occurs in lower 1.1 m of gravels and upper 1 m of bedrock; gold in quartz-carbonate veins associated with east-west-trending shear zone. Gold in district possibly related to granitic plutons in area. Niobium-bearing columbite and aeschynite occurs in tailings of drift placer mines near Tofty; concentrates of tailings contain between 0.2 and 4.5% Nb. Estimated 45,400 kg recoverable $Nb_2O_5$ in placer deposits near Tofty. SOURCES: Mertie, 1934; Wayland, 1961; Heiner and Wolff, 1968; Cobb, 1973; Southworth, 1984; Warner, 1985; Warner and Southworth, 1985; Warner and others, 1986.

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| PL22.<br>65 30<br>150 00 | Rampart.<br>Au, Cu, Ag, Bi,<br>Hg, W, Pb, Cr,<br>Sn | Placer Au. Tertiary granitic plutons, Paleozoic sedimentary and volcanic rocks | 2.71 million g Au |

DESCRIPTION: Bulk of gold production from drainages of Minook and Troublesome Creeks. Area nonglaciated. At least 4 prominent terraces in Minook Creek, about 3 to 900 m above sea level. Pliocene(?) gravel in highest terrace is up to 20 m thick and auriferous, but not generally commercial. More than half of produced gold in district from Little Minook

Creek. Heavy minerals include gold, garnet, barite, chrome spinel, pyrite, cinnabar, native bismuth, and tetrahedrite. Larger deposits at Ruby Creek, Hunter-Dawson Creek, Morelock Creek, Hoosier Creek, and Little Minook Creek. Ruby Creek: estimated 290,000 $m^3$ grading 0.67 $g/m^3$; mined mainly by open-cut and drift methods. Hunter-Dawson Creek: estimated 250,000 $m^3$ grading 2.6 $g/m^3$; hydraulic and drift mining; gold found in lower 1 m of gravel and upper 1.1 m of bedrock; local bedrock of shear zone with sulfide minerals and quartz-calcite veins, Morelock Creek: estimated 150,000 $m^3$ grading 3.6 $g/m^3$; sluice mining; gold occurs in lower few centimeters of gravel and upper few centimeters of irregular bedrock surface. Little Minook Creek: estimated 120,000 $m^3$ grading 13 $g/m^3$ Au, 1.1 $g/m^3$ Ag; estimated total production of 2.02 million g Au; gravels vary from 2 to 4 m thick with gold at base and in upper 0.2 m of bedrock. Gold in district probably derived from polymetallic vein lode deposits associated with Tertiary granitic rocks. SOURCES: Mertie, 1934; Waters, 1934; Chapman and others, 1963; Heiner and Wolff, 1968; Cobb, 1973.

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| PL23. | Tolovana. | Placer Au. Schist and | 11.7 million g Au. |
| 65 30 | Au, Sn, Cu, Pb, | sedimentary rocks, Cre- | 1.22 $g/m^3$, Livengood |
| 148 10 | Hg, W, Cr, Sb, | taceous granitic plutons | Creek |
| | REE, Bi | | |

DESCRIPTION: Auriferous stream and bench placers. Mature erosion surface largely buried by later sediments. Steam capture common. Rich buried bedrock benches, not completely exhumed. One of most recently discovered placer districts. Heavy minerals include gold, magnetite, hematite, ilmenite, limonite, chromite, spinel, cinnabar, stibnite, scheelite, cassiterite, monazite, and REE-minerals. Largest deposit at Livengood: may contain 30 million $m^3$ grading 1.44 $g/m^3$ Au. Gold possibly derived from polymetallic vein lode deposits associated with Cretaceous granitic plutons. SOURCES: Foster, 1966, 1969; Mertie, 1937b; Cobb, 1973; Eakins, 1981.

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| PL24. | Fairbanks. | Placer Au. Lower Paleo- | 238 million g Au. |
| 64 55 | Au, Sb, W, Sn, | zoic metavolcanic rocks, | 10.2 $g/m^3$ |
| 146 30 | Bi | Cretaceous granitic | |
| | | plutons | |

DESCRIPTION: Placers spatially associated with lower Paleozoic metavolcanic rocks. Area nonglaciated. Placers overlain by thick sections of frozen loess and muck. Larger deposits at Mud Creek, Cleary Creek, and Goldstream Creek. Mud Creek: estimated 4.6 million $m^3$ grading 0.15 $g/m^3$; produced about 65,583 g Au through 1981. Cleary Creek: estimated 2.9 million $m^3$ grading 14 $g/m^3$ Au and 2.5 $g/m^3$ Ag; produced about 35.1 million g Au from drift mines; mined by underground drift and dredging methods. Goldstream: estimated 900,000 $m^3$ grading 6.9 $g/m^3$ Au; estimated 6.2 million g produced by drift, open cut, and dredging methods. Gold in district derived from Cretaceous or early Tertiary Au quartz vein, polymetallic vein, and W skarn lode deposits, and partly from early Paleozoic or older volcanogenic massive sulfide deposits in Cleary sequence, part of early Paleozoic or older metamorphic rocks of Yukon Crystalline terrane. SOURCES: Smith, 1913a; Prindle and Katz, 1913; Mertie, 1918; Heiner and Wolff, 1968; Cobb, 1973.

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| PL25. | Circle. | Placer Au. Early Paleo- | 22.7 million g Au. |
| 65 30 | Au, Sn, Sb, W, | zoic or older metasedi- | 0.30 to 0.61 $g/m^3$ |
| 144 45 | Pb, REE, Mo, Hg | mentary rocks, granitic | |
| | | plutons | |

DESCRIPTION: Gold concentrated in alluvial and colluvial deposits (2 to 5 m thick), frequently overlain by 1 to 2 m of muck. Nonglaciated; broad upland of nearly accordant ridge crests. Large gold resource may be present in lower reaches of Crooked and Birch Creeks, and in the topographic trough south of Crazy Mountains. Larger deposits at Mammoth Creek, Deadwood Creek, Eagle Creek, and Coal Creek. Mammoth Creek: estimated 4.0 million $m^3$ grading 1.9 $g/m^3$ Au, 0.45 $g/m^3$ Ag; estimated production of up to 4.7 million g Au through 1926; mining by hydraulic and dredge methods; local quartz veins in bedrock; Deadwood Creek: estimated 1.44 million $m^3$ grading 2.3 $g/m^3$ Au and 0.49 $g/m^3$ Ag; estimated total production of over 93.3 million g Au; mined by dredge and hydraulic methods. Coal Creek: estimated 810,000 $m^3$ grading 0.38 $g/m^3$ Au, 0.041 $g/m^3$ Ag; estimated 311,000 g Au produced; dredge mining. Eagle Creek: estimated 760,000 $m^3$ grading 1.2 $g/m^3$ Au, 0.16 $g/m^3$ Ag; about 0.9 million Au g produced through 1906; recent production in 1985. Gold in

district probably derived from Cretaceous or early Tertiary Au quartz vein, polymetallic vein, skarn, and porphyry lode deposits in region in early Paleozoic or older metamorphic rocks of Yukon Crystalline terrane with recycling through Tertiary conglomerate. Alluvial diamond found in placer concentrate in 1982. SOURCES: Prindle, 1913; Mertie, 1938; Heiner and Wolff, 1968; Cobb, 1973; Yeend, 1982; Menzie and others, 1983; Lasley, 1985.

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| PL26.<br>65 00<br>142 00 | Eagle.<br>Au, Pt, Sn, Pb, Hg, Ag, Cr | Placer Au. Early Paleozoic or older metavolcanic and metasedimentary rocks, granitic plutons | 1.24 million g Au |

DESCRIPTION: Gold recycled in part through Cretaceous and Tertiary conglomerates. Heavy minerals include gold, platinum, cinnabar, cassiterite, chromite, and native silver. Most of area nonglaciated during Pleistocene time. Gold in district probably derived from combination of Au quartz and polymetallic vein, skarn, and porphyry Cu lode deposits associated with Cretaceous or Tertiary plutons intruding early Paleozoic or older metamorphic rocks of Yukon Crystalline terrane. SOURCES: Mertie, 1938; Cobb, 1973.

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| PL27.<br>64 20<br>142 00 | Fortymile.<br>Au, REE, Pb, Sn, W, Hg | Placer Au. Early Paleozoic or older metasedimentary rocks, granitic plutons, mafic stocks, Tertiary clastic rocks | 13.0 million g Au |

DESCRIPTION: Stream and bench placer deposits common. Most of production from dredging. Most of area nonglaciated during Pleistocene time. Loess mantles much of area. Only gold recovered commercially. One 778-g nugget recovered from Wade Creek deposit. Largest deposit at Wade Creek: estimated 650,000 $m^3$ grading 0.57 $g/m^3$ Au and 0.11 $g/m^3$ Ag; bedrock source of Au quartz-pyrite veins; mined by hydraulic, drift, dredge, and open cut methods. Gold in district derived from a combination of Au quartz and polymetallic vein lode deposits in metamorphic rocks near contacts with Cretaceous or early Tertiary felsic plutons intruding early Paleozoic or older metamorphic rocks of Yukon Crystalline terrane. SOURCES: Mertie, 1938, Cobb, 1973.

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| PL28.<br>63 40<br>150 50 | Kantishna.<br>Au, Sb, Pb, W, Mn | Placer Au. Early Paleozoic or older metasedimentary and metavolcanic rocks. Cretaceous granitic plutons | 2.80 million g Au; minor Sb, Ag |

DESCRIPTION: Placer deposits in modern streams and benches. Highlands glaciated. Lowlands covered by glaciofluvial and eolian deposits. Most mining on streams near Kantishna. Scheelite and nuggets of native silver recovered. Gold in district probably derived from polymetallic or Au quartz vein lode deposits that formed during Cretaceous regional metamorphism and or plutonism in Yukon Crystalline terrane. SOURCES: Capps, 1919; Cobb, 1973; Bundtzen, 1981.

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| PL29.<br>64 00<br>148 30 | Bonnifield.<br>Au, Hg, Pt, Sn, W | Placer Au. Early Paleozoic or older metasedimentary and metavolcanic rocks. Cretaceous granitic plutons | 1.40 million g Au |

DESCRIPTION: Gold from streams and a few benches. Thick glaciofluvial deposits and loess cover much of district. Heavy minerals include various sulfides, scheelite, cassiterite, cinnabar, and PGE. Gold in district probably derived from Cretaceous or early Tertiary Au quartz or polymetallic vein lode and early Paleozoic or older Kuroko massive sulfide deposits in Yukon Crystalline terrane, with probable recycling through Tertiary gravels. SOURCES: Capps, 1912; Cobb, 1973; Gilbert and Bundtzen, 1979; Bundtzen and Gilbert, 1983.

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| PL30.<br>62 20<br>151 00 | Yentna.<br>Au, Cu, Ag, Pt | Placer Au. Jurassic and Cretaceous graywacke and granitic plutons,<br><br>Tertiary conglomerate | 3.58 million g Au |

DESCRIPTION: Placers consist of stream and bench deposits, Pleistocene glaciofluvial deposits, and Tertiary conglomerates. Glacial and alluvial deposits blanket much of area. Most production in Cache Creek area from dredging operations. Heavy minerals include gold, platinum, cassiterite, scheelite, native copper, sulfides, and uranium and thorium minerals. Gold in district probably derived from Au quartz and polymetallic vein lode deposits associated with granitic plutons and dikes, and Upper Jurassic and Lower Cretaceous clastic rocks. SOURCES: Capps, 1913; Mertie, 1919; Cobb, 1973.

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| PL31.<br>63 00<br>143 30 | Valdez Creek.<br>Au, Cu, Pb | Placer Au. Metasedimentary rocks, Mesozoic graywacke, granitic plutons | 1.2 million g Au.<br>0.51 to 2.0 g/m$^3$ |

DESCRIPTION: Complex Pleistocene history. Gold produced from modern stream gravels and from channels buried by glacial drift. Estimated 2.1 million g Au delineated. Mined by open pit and sluice methods. Heavy minerals include gold, magnetite, pyrite, zircon, sphene, sillimanite, kyanite, galena, realgar, orpiment, hessite, and silver telluride. Gold in district probably derived from polymetallic vein deposits associated with Cretaceous granitic rocks. Extensive recent mining; one of largest placer mines in state. SOURCES: Chapin, 1918; Capps, 1919; Tuck, 1938; Smith, 1970; Cobb, 1973; Mining Journal, 1984; Bressler and others (1985).

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| PL32.<br>63 20<br>146 00 | Delta River.<br>Au | Placer Au. Upper Paleozoic volcanic rocks, ultramafic sills, granitic plutons | 31,100 to 77,750 g Au |

DESCRIPTION: Gold probably derived from numerous occurrences and prospects of polymetallic vein and porphyry Cu deposits associated with late Paleozoic porphyries and Mesozoic granitic plutons intruding upper Paleozoic sedimentary and submarine volcanic rocks of the Slana Spur and Eagle Creek Formations. Glacial and glaciofluvial deposits cover most of district. SOURCES: Rose, 1965a; Cobb, 1973; Ian M. Lange and Warren J. Nokleberg, written commun., 1984.

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| PL33.<br>63 00<br>144 30 | Chistochina.<br>Au, Pt, W, Cr, Zn, Hg, Pb | Placer Au. Tertiary conglomerate, unknown source | 4.39 million g Au.<br>0.51 g/m$^3$, Round Wash; 1.12 g/m$^3$, Quartz Creek |

DESCRIPTION: Most placer mining in the extreme headwaters of Chistochina River on Miller Gulch and Slate Creek. Gold occurs in Tertiary conglomerate named "Round Wash". Unknown source for lode gold and rock clasts in Tertiary conglomerate; source presumably offset along nearby Denali fault. Placer gold also produced from glacial drift in valleys in area. Heavy minerals include gold, platinum, magnetite, pyrite, chromite, native copper, native silver, galena, cinnabar, garnet, and scheelite. SOURCES: Rose, 1967; Cobb, 1973; Yeend, 1981a, b.

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| PL34.<br>62 15<br>142 00 | Chisana.<br>Au, Ag | Placer Au. Tertiary conglomerate, Cretaceous volcanic rocks | 1.40 million g Au |

DESCRIPTION: Placer deposits generally within a few kilometers of Bonanza Creek area. Most gold derived from Tertiary gravel. Heavy minerals of native copper, native silver, galena, cinnabar, and molybdenite. Most of placer deposits in Tertiary conglomerate near or deposited on volcanic and sedimentary rocks of the Lower Cretaceous Chisana Formation. Unconsolidated glacial and fluvial deposits cover most lowlands. SOURCES: Capps, 1916; Richter and Matson, 1972.

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| PL35.<br>61 20<br>142 45 | Nizina.<br>Au, Sb, Cu, Pb, Ag, Mo | Placer Au. Jurassic and Cretaceous graywacke, Cretaceous and early Tertiary granitic plutons | 4.48 million g Au |

DESCRIPTION: Placer deposits in Quaternary sediments in valley fills and on benches. Native copper produced from some placers. One 3-tonne native copper nugget recovered. Heavy minerals include gold, native copper, native silver, and galena. Gold probably derived from vein lode deposits in Cretaceous or early Tertiary granitic plutons. Some gold possibly derived from Cu-Ag vein lode deposits in the Nikolai Greenstone. SOURCES: Moffit, 1914; Cobb and Matson, 1972; Cobb and MacKevett, 1980.

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| PL36.<br>57 45<br>153 30 | Kodiak.<br>Au, Cr, Pt | Placer Au. Upper Cretaceous graywacke, granitic plutons, Tertiary sandstone | 31,100 to 62,200 g Au |

DESCRIPTION: Gold concentrated in beach deposits and in sand dunes that are derived from glacial outwash and tills. Preglacial placers removed during Pleistocene glaciation. Heavy minerals include magnetite, pyrite, chromite, and platinum. Gold probably derived from Au quartz vein deposits in graywacke and argillite of the Upper Cretaceous Kodiak Formation. Platinum probably derived from the Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985). SOURCES: Capps, 1937; Cobb, 1973.

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| PL37.<br>61 10<br>149 30 | Hope.<br>Au, Cu, Sb, Hg, Pb | Placer Au. Upper Cretaceous graywacke and phyllite | 3.1(?) million g Au |

DESCRIPTION: Gold occurs in streams and bench gravels; recycled in part from glacial and glaciofluvial deposits. Mills and Canyon Creeks are most productive streams. Mining with small dredges and hydraulic systems. Heavy minerals include gold, native silver, native copper, sulfides, scheelite, and cinnabar. Largest deposit at Crow Creek placer: estimated 1,200,000 $m^3$ grading 1.1 $g/m^3$; gold in blue or yellow clays near false bedrock; most production from bench gravels. Gold in district mostly derived from Au quartz vein lode deposits in metagraywacke and phyllite of the Upper Cretaceous Valdez Group. SOURCES: Moffit, 1906; Martin and others, 1915; Cobb and Richter, 1972; Jansons and others, 1984; Winkler and others, 1984.

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| PL38.<br>61 40<br>149 00 | Willow Creek.<br>Au, Cu, W, Pt | Placer Au. Jurassic granitic and volcanic rocks, Tertiary conglomerate | 2.8 million g Au |

DESCRIPTION: Bulk of placer gold produced from Grubstake Gulch, Alfred Creek, and Willow Creek. Heavy minerals include gold, chalcopyrite, and platinum. Derived from polymetallic vein lode or Au quartz vein deposits in the Jurassic Talkeetna Mountains batholith, adjacent schist. In part, recycled in Tertiary conglomerate. SOURCES: Capps, 1915; Jasper, 1967b; Cobb, 1973.

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| PL39.<br>61 40<br>145 00 | Nelchina.<br>Au, Pt, W | Placer Au. Upper Cretaceous metagraywacke and phyllite | 90,200 g Au.<br>15.2 to 20.3 g/$m^3$,<br>Albert Creek |

DESCRIPTION: Gold occurs in stream gravels and low benches, probably derived from Tertiary continental deposits. Fine gold occurs in glacial and glaciofluvial deposits. Much of gold within 1 m of bedrock and on bedrock surface. Scheelite and platinum in some samples. Gold probably derived from Au quartz vein deposits in metagraywacke and phyllite of the Upper Cretaceous Valdez Group. SOURCES: Moffit and Capps, 1911; Chapin, 1918; Jasper, 1967b; Cobb and Matson, 1972.

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| PL40.<br>60 05<br>142 00 | Yakataga.<br>Au, Cr, Cu | Placer Au.<br>Varied bedrock units | 500,000 g Au |

DESCRIPTION: Gold occurs in beach deposits along coastal plain extending east-southeast from mouth of Copper River. Gold also occurs in bench and streams of White River. Heavy minerals include gold, magnetite, zircon, chromite, rutile, native copper. Derived from variety of bedrock sources drained by Copper River, including: (1) graywacke and argillite of lower Tertiary Orca Group and associated mafic extrusive rocks and mafic and granitic plutons, and (2) metagraywacke and phyllite of the Upper Cretaceous Valdez Group, and associated mafic extrusive rocks and granitic plutons. Possible recycling in glacial deposits in region. SOURCES: Maddren, 1914; Cobb, 1973.

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| PL41.<br>59 00<br>138 00 | Yakutat,<br>(Lituya Bay).<br>Au, Pt, Fe, Ti | Placer Au and Ti.<br>Varied bedrock units | 115,000 g Au. Estimated 4.6 million $m^3$<br>grading 1.0% ilmenite |

DESCRIPTION: Beach sands with gold and other heavy minerals at Yakutat. Fine platinum and ilmenite present in low concentrations in Lituya Bay. Placer deposits derived from same varied bedrock sources as for Yakataga district. SOURCES: Tarr and Butler, 1909; Mertie, 1933; Brew and others, 1978; Thomas and Berryhill, 1962.

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SOUTHEASTERN ALASKA

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| PL42.<br>59 20<br>136 08 | Porcupine Creek.<br>Au, Pb, Cu, Zn | Placer Au. Paleozoic limestone, clastic and younger granitic rocks | 1.90 million g Au |

DESCRIPTION: Placer deposits in streams incised in bedrock, various bench gravels, and glacial till. Heavy minerals include gold, galena, magnetite, scheelite, chalcopyrite, pyrite, and arsenopyrite. Gold probably derived from Cretaceous or early Tertiary Au quartz and polymetallic vein lode deposits in Paleozoic slate of Alexander belt. SOURCES: Eakin, 1919; Beatty, 1937; Wright, 1940; Bundtzen, 1986.

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| PL43.<br>58 18<br>134 22 | Juneau.<br>Au | Placer Au. Paleozoic and Mesozoic slate, quartzite, schist, gneiss, amphibolite | 1.88 million g Au |

DESCRIPTION: Placer deposits occur mainly in Gold Creek. Deposits consist of: hill placers, broken lode material; gulch placers, derived from lode material by mass wasting on steep slopes; and creek placers. Alluvial gravels contain most of placer gold. Much of placer material eroded and transported by glaciers; now partly in submerged glacial deposits. Possible submerged gold placer deposits along Gastineau Channel. Gold in district probably derived from Cretaceous or early Tertiary Au quartz and polymetallic vein lode deposits in western belt of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). SOURCES: Spencer, 1906; Cobb, 1973.

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## INDEXES TO METALLIFEROUS LODE DEPOSITS AND PLACER DISTRICTS

In this report, Alaska is divided into seven geographic regions for the tabular descriptions of metalliferous lode deposits which are numbered separately for each region. Each region is identified by a two letter prefix that is part of the deposit number. The regions and abbreviations are the Brooks Range (BR), the Seward Peninsula (SP), west-central Alaska (WC), east-central Alaska (EC), the Aleutian Islands and Alaska Peninsula (AP), southern Alaska (SO), and southeastern Alaska (SE). The prefix for all placer districts is PL. Deposits are indexed alphabetically, and by mineral deposit type.

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| Erie | SO30 |
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| Esotuk Glacier | BR27 |
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| Melozitna | PL20 |
| Michigan Creek | BR20 |
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| Mosquito | EC20 |
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| Mount Burnett | SE13 |
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| Mount Igikpak | BR21 |
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| Nimbus | SO12 |
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| Nizina | PL35 |
| Noatak | PL3 |
| Nome (Lode) | SP10 |
| Nome (Placer) | PL6 |
| North Bradfield Canal | SE10 |
| Nualaska | SO42 |
| Nugget Creek | SO29 |
| Nuka Bay | SO42 |
| Nunatak | SE27 |
| Ohio Creek | SO13 |
| Omar | BR11 |
| Omilak | SP7 |
| Orange Hill | SO24 |
| Orange Point | SE25 |
| Owhat | WC7 |
| Palmer Creek | SO44 |
| Pandora | SO54 |
| Partin Creek | SO8 |
| Pass Creek | SO15 |
| Perserverance | WC26 |
| Picnic Creek | BR17 |
| Pond | AP17 |
| Porcupine Creek | PL42 |
| Porcupine Lake | BR28 |
| Port Camden | SE34 |
| Port Clarence | PL7 |

| DEPOSIT OR DISTRICT | NUMBER |
|---|---|
| Port Valdez | SO50 |
| Potato Mountain | SP2 |
| Prospect Bay | AP9 |
| Purdy | EC21 |
| Purkeypile | SO6 |
| Pyramid | AP6 |
| Pyrola | SE31 |
| Quartz Creek | WC28 |
| Quartz Hill | SE19 |
| Quigley Ridge | WC28 |
| Rainbow Mountain | SO19 |
| Rainy Creek District | SO18 |
| Rambler | SO24 |
| Rampart | PL22 |
| Ramsay-Rutherford | SO51 |
| Rat Fork | SO3 |
| Ready Cash | SO10 |
| Red Devil | WC6 |
| Red Dog Creek | BR2 |
| Red Mountain (East-Central) | EC35 |
| Red Mountain (Southern) | SO38 |
| Red River | SE21 |
| Reef Ridge | WC19 |
| Reid Inlet | SE26 |
| Reliance | SE20 |
| Rex | AP13 |
| Riverside | SE11 |
| Roe Point | SE20 |
| Romanzof Mountains | BR29 |
| Roosevelt Creek | BR19 |
| Ross Adams | SE51 |
| Roy Creek (Mount Prindle) | EC6 |
| Rua Cove | SO55 |
| Ruby | PL18 |
| Ruby Creek | BR16 |
| Ruth Creek | EC4 |
| Salcha River | EC12 |
| Salmon Bay | SE38 |
| Salt Chuck | SE40 |
| San Diego Bay | AP7 |
| Sawtooth Mountain | EC3 |
| Schlosser | SO58 |
| Scrafford | EC14 |
| Sea Level | SE16 |
| Sedanka | AP1 |
| Serpentine Hot Springs | SP6 |
| Sheep Creek | EC33 |
| Shellebarger Pass | SO5 |
| Shumagin | AP5 |
| Shungnak | PL2 |
| Silver King | SO12 |
| Siniktanneyak Mountain | BR8 |
| Sischu Creek | WC21 |
| Slate Creek (Southern) | SO21 |
| Slate Creek (Fortymile) (East-Central) | EC25 |
| Slate Creek (Kantishna) (East-Central) | EC27 |
| Smucker | BR13 |
| Snow Gulch | WC9 |
| Spirit Mountain | SO40 |
| Spruce Creek | EC30 |
| Stampede | EC31 |

| DEPOSIT OR DISTRICT | NUMBER |
|---|---|
| Standard Copper | SO57 |
| Story Creek | BR9 |
| Sukakpak Mountain | BR22 |
| Sumdum | SE7 |
| Sumdum Chief | SE8 |
| Sun | BR17 |
| Sweetheart Ridge | SE6 |
| Table Mountain | EC9 |
| Taurus | EC24 |
| Taylor Mountains | WC5 |
| Thorpe | SO35 |
| Threeman | SO57 |
| Tibbs Creek | EC19 |
| Tin Creek | SO4 |
| Tolovana | PL23 |
| Tolstoi | WC13 |
| Treadwell | SE5 |
| Treasure Creek | SO14 |
| Tuxedni Bay | AP20 |
| Union Bay | SE13 |
| Upper Kanuti River | WC34 |
| Valdez Creek | PL30 |
| Venus | BR23 |
| Victor | BR23 |
| Warner Bay | AP9 |
| Westover | SO32 |
| Wheeler Creek | WC29 |
| White Mountain | WC17 |
| Whoopee Creek | BR10 |
| William Henry Bay | SE28 |
| Willow Creek (Lode) | SO35 |
| Willow Creek (Placer) | PL38 |
| Windy Creek | SP8 |
| Winfield | SP4 |
| Win-Won | WC16 |
| Wiseman | PL4 |
| WTF | EC35 |
| Yakataga | PL40 |
| Yakima | SE4 |
| Yakutat | PL41 |
| Yentna | PL30 |
| Zackly | SO16 |
| Zane Hills | WC31 |
| Zarembo Island | SE37 |

## MINERAL DEPOSIT TYPE INDEX – LODE DEPOSITS

| DEPOSIT NUMBER | NAME |
|---|---|
| **KUROKO MASSIVE SULFIDE** | |
| BR4 | Drenchwater |
| BR13 | Smucker |
| BR14 | Arctic |
| BR15 | BT |
| BR15 | Jerri Creek |
| BR17 | Sun |
| BR19 | Roosevelt Creek |
| BR20 | Michigan Creek |
| EC32 | Liberty Bell |
| EC33 | Sheep Creek |
| EC34 | Anderson Mountain |
| EC35 | WTF, Red Mountain |
| EC36 | Miyaoka |
| EC36 | Hayes Glacier |
| EC37 | McGinnis Glacier |
| EC38 | Delta District |
| SE23 | Glacier Creek |
| SE25 | Orange Point |
| SE30 | Greens Creek |
| SE31 | Pyrola |
| SE35 | Kupreanof Island |
| SE36 | Helen S. |
| SE37 | Zarembo Island |
| SE43 | Khayyam |
| SE49 | Niblack |
| SE52 | Barrier Islands |
| SE53 | Driest Point |
| **BESSHI MASSIVE SULFIDE** | |
| SO5 | Shellebarger Pass |
| SO15 | Denali |
| SO52 | Midas |
| SO53 | Latouche, Beatson |
| SO56 | Ellamar |
| SO58 | Fidalgo-Alaska |
| SO58 | Schlosser |
| SE4 | Yakima |
| **CYPRUS MASSIVE SULFIDE** | |
| SO54 | Knight Island |
| SO55 | Copper Bullion |
| SO55 | Rua Cove |
| SO57 | Threeman |
| SO57 | Standard Copper |
| **SEDIMENTARY EXHALATIVE Zn-Pb** | |
| BR1 | Lik |
| BR2 | Red Dog Creek |
| BR4 | Drenchwater |
| **KIPUSHI Cu-Pb-Zn** | |
| BR11 | Omar |
| BR16 | Ruby Creek |

| DEPOSIT NUMBER | NAME |
|---|---|
| | METAMORPHOSED SULFIDE |
| BR18 | Ann |
| SP15 | Hannum Creek |
| SE6 | Sweetheart Ridge |
| SE7 | Sumdum |
| SE9 | Groundhog Basin |
| SE12 | Alamo |
| SE15 | Mahoney |
| SE18 | Moth Bay |
| SE20 | Reliance |
| SE21 | Red River |
| SE33 | Cornwallis Peninsula |
| SE45 | Copper City |
| SE46 | Moonshine |
| | BEDDED BARITE |
| BR3 | Nimiuktuk |
| SE35 | Castle Island |
| SE47 | Lime Point |
| | SANDSTONE U |
| SP14 | Death Valley |
| SE34 | Port Camden |
| | BASALTIC Cu |
| SO30 | Kennecott district |
| SO32 | Westover |
| SO33 | Nelson |
| SO34 | Erickson |
| SE60 | Baker Peak |
| | HOT SPRING Hg |
| WC3 | Cinnabar Creek |
| WC6 | Red Devil |
| WC8 | DeCoursey Mountain |
| WC17 | White Mountain |
| | EPITHERMAL VEIN |
| WC5 | Taylor Mountains |
| WC34 | Upper Kanuti River |
| AP2 | Canoe Bay |
| AP3 | Aquila |
| AP4 | Apollo-Sitka |
| AP5 | Shumagin |
| AP7 | San Diego Bay |
| AP11 | Mallard Duck Bay |
| AP16 | Kuy |
| AP17 | Fog Lake |
| AP21 | Johnson Prospect |

| DEPOSIT NUMBER | NAME |
|---|---|
| | Au QUARTZ VEIN |
| BR21 | Mount Igikpak |
| BR21 | Arrigetch Peaks |
| BR26 | Chandalar District |
| SP10 | Nome district |
| SP11 | Big Hurrah |
| SP12 | Daniels Creek |
| WC4 | Fortyseven Creek |
| EC9 | Table Mountain |
| EC18 | Democrat |
| E21 | Purdy |
| SO35 | Willow Creek |
| SO41 | Chalet Mountain |
| SO42 | Nuka Bay |
| SO43 | Alaska Oracle |
| SO44 | Lucky Strike |
| SO45 | Crown-Point |
| SO45 | Kenai-Alaska |
| SO46 | Monarch |
| SO46 | Jewel |
| SO47 | Mineral King |
| SO48 | Granite |
| SO49 | Gold King |
| SO50 | Cliff |
| SO51 | Ramsay-Rutherford |
| SE1 | Jualin |
| SE2 | Kensington |
| SE3 | Alaska-Juneau |
| SE5 | Treadwell |
| SE8 | Sumdum Chief |
| SE11 | Riverside |
| SE14 | Gold Standard |
| SE16 | Sea Level |
| SE17 | Goldstream |
| SE26 | Reid Inlet |
| SE42 | Dawson |
| SE48 | Golden Fleece |
| SE57 | Apex |
| SE57 | El Nido |
| SE58 | Cobol |
| SE61 | Chichagoff |
| SE61 | Hirst-Chichagof |
| | Cu-Ag QUARTZ VEIN |
| SO8 | Partin Creek |
| SO17 | Kathleen-Margaret |
| SO29 | Nugget Creek |
| SO31 | Nikolai |
| | POLYMETALLIC VEIN |
| BR18 | Ann |
| BR21 | Mount Igikpak |
| BR21 | Arrigetch Peaks |
| BR28 | Porcupine Lake |
| BR29 | Romanzof Mountains |
| BR31 | Galena Creek |
| SP6 | Serpentine Hot Springs |
| SP7 | Omilak area |

| DEPOSIT NUMBER | NAME |
|---|---|
| | POLYMETALLIC VEIN (Continued) |
| SP9 | Independence |
| WC7 | Mission Creek |
| WC7 | Owhat |
| WC4 | Fortyseven Creek |
| WC10 | Chicken Mountain |
| WC11 | Golden Horn |
| WC11 | Malemute |
| WC11 | Granite |
| WC12 | Broken Shovel |
| WC13 | Cirque |
| WC13 | Tolstoi |
| WC14 | Independence |
| WC15 | Candle |
| WC16 | Win-Won |
| WC25 | Illinois Creek |
| WC26 | Perserverance |
| WC27 | Beaver Creek |
| WC28 | Quartz Creek |
| WC34 | Upper Kanuti River |
| EC1 | Hot Springs Dome |
| EC15 | Cleary Summit |
| EC17 | Ester Dome |
| EC19 | Blue Lead |
| EC19 | Tibbs Creek |
| EC19 | Gray Lead |
| EC28 | Quigley Ridge |
| EC29 | Banjo |
| EC30 | Spruce Creek |
| EC31 | Stampede |
| AP1 | Sedanka |
| AP8 | Kawisgag |
| AP9 | Warner Bay |
| AP10 | Cathedral Creek |
| AP10 | Braided Creek |
| AP15 | Kilokak Creek |
| AP22 | Kijik River |
| AP23 | Bonanza Hills |
| SO8 | Partin Creek |
| SO10 | Ready Cash |
| SO12 | Nim and Nimbus |
| SO22 | Chistochina |
| SO25 | Nabesna Glacier |
| SE11 | Riverside |
| SE27 | Nunatak |
| SE39 | Coronation Island |
| SE42 | Dawson |
| SE50 | Bay View |
| | Sb-Au VEIN |
| BR22 | Sukakpak Mountain |
| WC9 | Snow Gulch |
| EC3 | Sawtooth Mountain |
| EC4 | Gertrude Creek |
| EC4 | Griffen |
| EC4 | Ruth Creek |
| EC8 | Dempsey Pup |
| EC14 | Scrafford |
| EC19 | Blue Lead |

| DEPOSIT NUMBER | NAME |
|---|---|
| | Sb-Au VEIN (Continued) |
| C27 | Slate Creek |
| EC27 | Eagles Den |
| EC27 | Caribou Creek |
| EC31 | Stampede |
| | Sn GREISEN |
| SP3 | Lost River |
| SP5 | Kougarok |
| EC7 | Lime Peak |
| EC12 | Ketchem Dome |
| SO6 | Boulder Creek |
| SO9 | Coal Creek |
| SO13 | Ohio Creek |
| | Sn VEIN |
| SP1 | Cape Mountain |
| SP2 | Potato Mountain |
| EC7 | Lime Peak |
| SO9 | Coal Creek |
| SO13 | Ohio Creek |
| | Sn SKARN |
| SP3 | Lost River |
| SP4 | Ear Mountain area |
| | Cu-Zn-Pb SKARN |
| BR21 | Mt. Igikpak |
| BR21 | Arrigetch Peaks |
| BR23 | Victor |
| BR24 | Jim-Montana |
| WC18 | Nixon Fork-Medfra |
| AP18 | Crevice Creek |
| AP24 | Glacier Fork |
| SO1 | Bowser Creek |
| SO3 | Rat Fork |
| SO3 | Sheep Creek |
| SO4 | Tin Creek |
| SO16 | Zackly |
| SO18 | Rainy Creek |
| SO24 | Orange Hill |
| SO27 | Midas |
| SE32 | Kupreanof Mountain |
| SE44 | Jumbo district |
| | W SKARN |
| WC35 | Bonanza Creek |
| EC13 | Salcha River |
| EC16 | Gilmore Dome |
| | Fe SKARN |
| WC20 | Medfra |
| AP19 | Kasna Creek |
| AP20 | Magnetite Island |

| DEPOSIT NUMBER | NAME |
|---|---|
| | Fe SKARN (Continued) |
| SO23 | Nabesna, Rambler |
| SE10 | North Bradfield Canal |
| SE41 | Kasaan Peninsula |
| | PORPHYRY Cu-Mo |
| BR25 | Geroe Creek |
| E20 | Mosquito |
| E22* | Asarco |
| E23 | Bluff |
| EC24 | Taurus |
| AP11 | Mallard Duck Bay |
| SO14 | Treasure Creek |
| SO24 | Orange Hill |
| SO24 | Bond Creek |
| SO28 | London and Cape |
| SE27 | Nunatak |
| | PORPHYRY Cu |
| BR23 | Victor |
| WC13 | Cirque |
| WC25 | Illinois Creek |
| EC10 | Bedrock Creek |
| AP6 | Pyramid |
| AP8 | Kawisgag |
| AP12 | Bee Creek |
| AP13 | Rex |
| AP22 | Kijik River |
| AP23 | Bonanza Hills |
| SO11 | Golden Zone |
| SO19 | Rainbow Mountain |
| SO21 | Slate Creek |
| SO22 | Chistochina |
| SO26 | Baultoff |
| SO26 | Horsfeld |
| SO26 | Carl Creek |
| SE24 | Margerie Glacier |
| | PORPHYRY Mo |
| BR30 | Bear Mountain |
| SP8 | Windy Creek |
| WC24 | McLeod |
| AP14 | Mike |
| SO7 | Miss Molly |
| SE19 | Quartz Hill |
| | FELSIC PLUTONIC U |
| SP13 | Eagle Creek |
| WC21 | Sischu Creek |
| WC29 | Wheeler Creek |
| WC30 | Clear Creek |
| WC31 | Zane Hills |
| EC6 | Roy Creek |
| SE28 | William Henry Bay |
| SE38 | Salmon Bay |
| SE51 | Bokan Mountain |

| DEPOSIT NUMBER | NAME |
|---|---|
| | GABBROIC Ni-Cu |
| SO2 | Chip-Loy |
| SO40 | Spirit Mountain |
| SE29 | Funter Bay |
| SE55 | Brady Glacier |
| SE56 | Bohemia Basin |
| SE59 | Mirror Harbor |
| | ZONED MAFIC-ULTRAMAFIC |
| WC2 | Kemuk Mountain |
| SE13 | Union Bay |
| SE22 | Klukwan |
| SE40 | Salt Chuck |
| SE54 | Duke Island |
| | PODIFORM CHROMITE |
| BR5 | Iyikrok Mountain |
| BR6 | Avan |
| BR7 | Misheguk Mountain |
| BR8 | Sinitanneyak Mountain |
| WC22 | Mount Hurst |
| WC23 | Kaiyuh Hills |
| WC33 | Caribou Mountain |
| WC33 | Holonada |
| EC26 | Eagle C3 |
| SO36 | Halibut Bay |
| SO37 | Claim Point |
| SO38 | Red Mountain |
| SO39 | Bernard |
| SO39 | Dust Mountain |
| | SERPENTINE-HOSTED ASBESTOS |
| WC32 | Asbestos Mountain |
| EC25 | Slate Creek |
| | UNCLASSIFIED LODE DEPOSITS |
| BR9 | Story Creek (Pb-Zn-Au-Ag vein) |
| BR10 | Whoopee Creek (Zn-Ag-Au vein) |
| BR12 | Frost (Cu-Zn-Pb-Ba vein) |
| WC1 | Katagi Lake (Sb-Hg vein) |
| WC19 | Reef Ridge (Carbonate-hosted sulfide) |
| EC2 | Avnet (Mn-Ag vein) |
| EC5 | Hudson Cinnabar (Hg quartz vein) |
| EC11 | Miller House (Au-As vein) |
| SO20 | Fish Lake (Dunitic Ni-Cu) |

| DEPOSIT NUMBER | NAME |
|---|---|
| | PLACER Au |
| PL1 | Kiana |
| PL2 | Shungnak |
| PL3 | Noatak |
| PL4 | Wiseman |
| PL5 | Chandalar |
| PL6 | Nome |
| PL7 | Port Clarence |
| PL8 | Kougarok |
| PL9 | Council |
| PL10 | Koyuk |
| PL11 | Fairhaven |
| PL12 | Goodnews Bay |
| PL13 | Marshall |
| PL14 | Aniak |
| PL15 | Iditarod |
| PL16 | Innoko |
| PL17 | McGrath |
| PL18 | Ruby |
| PL19 | Hughes |
| PL20 | Melozitna |
| PL21 | Hot Springs |
| PL22 | Rampart |
| PL23 | Tolovana |
| PL24 | Fairbanks |
| PL25 | Circle |
| PL26 | Eagle |
| PL27 | Fortymile |
| PL28 | Kantishna |
| PL29 | Bonnifield |
| PL30 | Yentna |
| PL31 | Valdez Creek |
| PL32 | Delta River |
| PL33 | Chistochina |
| PL34 | Chisana |
| PL35 | Nizina |
| PL36 | Kodiak |
| PL37 | Hope |
| PL38 | Willow Creek |
| PL39 | Nelchina |
| PL40 | Yakataga |
| PL41 | Yakutat |
| PL42 | Porcupine Creek |
| PL43 | Juneau |
| | PLACER Sn |
| PL7 | Port Clarence |
| PL8 | Kougarok |
| PL21 | Hot Springs |
| | PLACER PGE-Au |
| PL12 | Goodnews Bay |
| PL13 | Marshall |
| | SHORELINE PLACER Ti |
| PL41 | Yakutat |

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